BLUE JAY

June 1989

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Cover: *Yellow Immaculate Lily, Doris Silcox*

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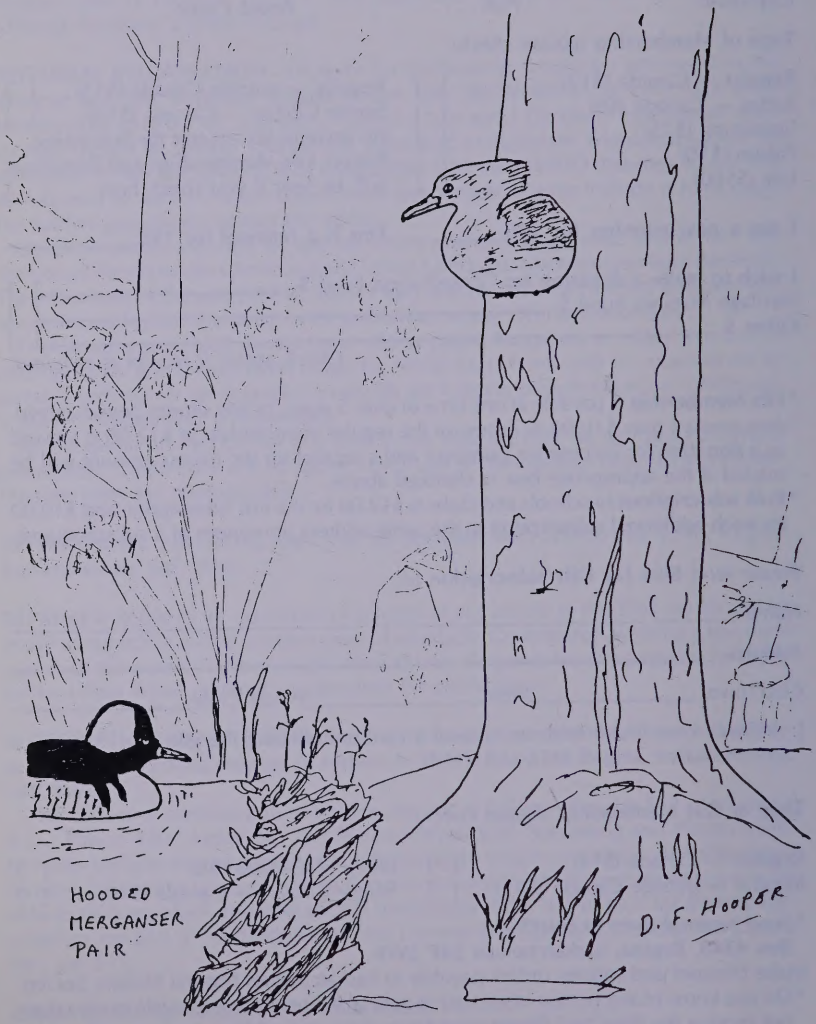
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BLUE JAY

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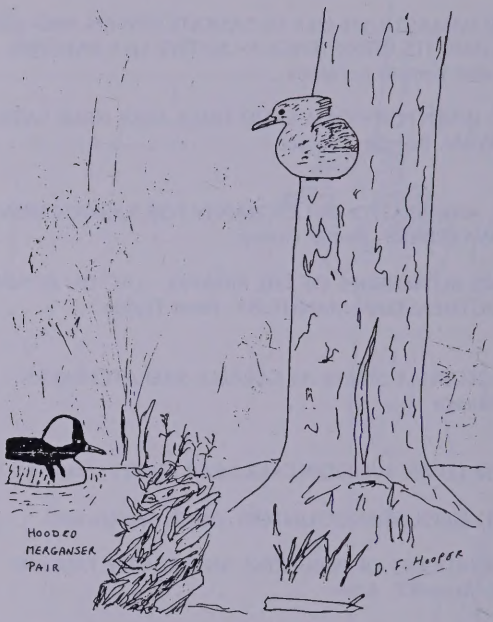
FOR YOUR INFORMATION . . .

Unusual production problems have brought lengthy delays in preparation of all 1989 *Blue Jay* issues. The Society expects to be back on a normal schedule soon. Although not necessarily chronologically, all issues are expected to appear before the end of 1989.



A BIG THANK YOU . . .

Mary Gilliland, special editor for this issue of *Blue Jay*, thanks the following Saskatoon volunteers for very welcome help in its preparation: Marshall Gilliland, Bernie Gollop, Mary and Stuart Houston, Thelma Pepper, Stan Rowe, Jim Wedgwood, Jim Wood, Lois Wooding and, especially, Cathy and Kelly Wylie.

THIS ORGANIZATION RECEIVES FUNDING FROM

SASKATCHEWAN LOTTERIES

EDWIN HOLLIS, MAMMALOGIST IN THE TOUCHWOOD HILLS, 1901-02.

C. STUART HOUSTON, 863 University Drive, Saskatoon, Saskatchewan. S7N 0J8

The contributions to Saskatchewan mammalogy of Dr. John Richardson at Carlton House and Cumberland House in the 1820s are well known, commemorated as they are in the names of Richardson's and Franklin's Ground Squirrels.[8 9] Less well known is that Will C. Colt[6] collected the type specimen of the Least Weasel near Osler, Saskatchewan, on 15 July 1895.[1]

Also unknown to most modern naturalists is an English mammalogist, Edwin Hollis, who collected in Saskatchewan's Touchwood Hills at the turn of the century. After some experience in the British Museum (Natural History), where he apparently learned to make study skins, Edwin Hollis came to Kutawa, a telegraph office and post office on the old Telegraph Trail between Qu'Appelle and Humboldt, and northeast of present Punnichy.[2] Arriving on 7 July 1901, he stayed until 23 April 1902 as a guest of his relative, Joseph Hollis, who had arrived in 1884 to ranch on the northeast quarter of section 30, township 28, range 15, west of the second meridian.[7]

Species collected by Edwin Hollis (using Banfield's modern names) and published in an annotated list in *The Zoologist* were: Red Bat, Hoary Bat, Ermine, Long-tailed Weasel, American Mink, Striped Skunk, American Badger, Red Fox, Coyote, Richardson's Ground Squirrel, Franklin's Ground Squirrel, Thirteen-lined Ground Squirrel, Least Chipmunk, Northern Pocket Gopher, Northern Grasshopper Mouse, Deer Mouse, Gapper's Red-backed Vole, Meadow Vole, Prairie Vole, Muskrat, Meadow Jumping Mouse, Snowshoe Hare, and an American Bison skull.[4 5] It is of interest that in this Touchwood Hills parkland country, not one White-tailed Jackrabbit was collected.

On his return to England, Hollis gave a paper to a well-attended meeting of the Exeter College Field Club and Natural History Society, "Notes of a Naturalist in N.W. Canada." He also exhibited "a very nice collection of water-colour sketches of most of the animals dealt with, drawn by his wife." According to the *Devon and Exeter Gazette* of 16 January 1906, these illustrations "added much to the interest and lucidity of his

Announcement of Hollis' Exeter program.

Royal Albert Memorial

COLLEGE FIELD CLUB AND NATURAL HISTORY SOCIETY.

EVENING MEETING,

Saturday, January 13th, 1906, at 8 o'clock,

IN THE

COLLEGE LECTURE ROOM

NOTES AND EXHIBITS.

ILLUSTRATED PAPER by

Mr. E. HOLLIS,

"Notes of a Naturalist in N.W. Canada."

Each Member may introduce two Friends.

COFFEE.

F. R. ROWLEY,
Hon. Sec.

THE MUSEUM.

paper." The mammal collection, which Hollis presented to the British Museum (Natural History) in London, embraced 23 species, five of which were new to the museum, and ranged in size from the coyote to the shrew.

Hollis lived in Exeter between 1905 and 1908. He prepared many small mammal specimens, helped out at the Exeter Museum in a voluntary capacity and donated "a vast number of specimens to the museum." Other specimens of small mammals were donated by "Miss Hollis," who almost certainly had created the earlier water-colours. There is no record of his having married.

In January 1908, Hollis became curator and librarian at the Bucks [Buckinghamshire] Archaeological Society's Museum at Aylesbury and held this post for 33 years. He soon widened his interests, from mammalogy and taxidermy, to include local history and prehistory, especially ancient manuscripts and documents and tradesmen's tokens. He also did much educational work with school children, especially those evacuated to Exeter from London during the war.

Hollis published little, but a note on the occurrence of the Lesser Horseshoe Bat in Devonshire appeared in *The Zoologist* on 15 March 1907. An article on Devon tokens in the *Transactions of the Devon Association*, 77:177, 1945, speaks of him as Edwin Hollis, F.Z.S. (Fellow of the Zoological Society, London). Hollis died on 12 July 1941, at the age of 78.[3] A modest and retiring man, he apparently left no extant photograph.

Acknowledgements

I thank the late Cliff Shaw, whose interest in Kutawa and the Touchwood Hills post of the Hudson's Bay Company first made me aware of Edwin Hollis. P.D. Jenkins at the British Museum (Natural History), London; Kelvin Boot, Curator of Natural History at the Royal Albert Memorial Museum, Exeter; and Christopher N. Gowing, curator, Buckinghamshire County Museum, Aylesbury, all provided useful information about Edwin Hollis' correspondence, specimens and career. Darcy Hande at the Saskatchewan Archives kindly provided access to the original homestead files of Joseph Hollis.

[1] BANGS, OUTRAM. 1896. The weasels of eastern North America. *Proc. Biological Soc. Washington* 10:1-24.

[2] COSSAR, MARY E., ed. 1955. Tales of the Touchwoods: From 1880-1953. Regina: Western Printers. 110 pp.

[3] ELAND, GEORGE. 1941. Memorial to Edwin Hollis. Records of Bucks, Chapter 14.

[4] HALL, E. RAYMOND. 1938. Mammals from Touchwood Hills, Saskatchewan. *Can. Field-Nat.* 52: 108-109.

[5] HOLLIS, EDWIN. 1902. Collecting small mammals in N.W.T. Canada. *The Zoologist*, series 4, vol. 6: 294-299.

[6] HOUSTON, C.S. 1970. Will C. Colt's migration records for Osler, Saskatchewan. *Blue Jay* 28:7-10.

[7] PUNNICHY AND DISTRICTS HISTORY BOOK COMMITTEE. 1983. Between the Touchwoods: a history of Punnichy and districts. Punnichy and Districts History Book Committee, Punnichy, SK.

[8] RICHARDSON, J. 1829. Fauna Boreali-Americana, or the zoology of the northern parts of British America. Part First: The mammals. London: John Murray.

[9] SABINE, J. 1822. Account of the marmots of North America hitherto known, with notices and descriptions of three new species. *Trans. Linnean Soc.* 13:19-31.

THE YELLOW IMMACULATE LILY IN SASKATCHEWAN AND ADJACENT MANITOBA, AND ITS PERSISTENCE IN NATIVE LILY PATCHES

DORIS SILCOX, Box 549, Carlyle, Saskatchewan, S0C 0R0, and VERNON L. HARMS, The W.P. Fraser Herbarium and Biology Department, University of Saskatchewan, Saskatoon, Saskatchewan. S7N 0W0

The beautiful native "Yellow Immaculate Lily," characterized by unspotted, lemon-yellow perianth parts, is an apparently very rare, naturally occurring colour form of the common Western Red Wood Lily (or "Prairie Lily"), Saskatchewan's official floral emblem. This yellow-flowered lily form was first discovered and collected by E.H. Moss (*no. 2213*, GH) from Jenkins Lake, northwest of Athabasca, Alberta, at 68-24-W4 (54°56'N, 113°36'W) and formally described and named in 1934 by H.M. Raup as *Lilium philadelphicum* L. var. *andinum* (Nutt.) Ker. forma *immaculatum* Raup.[3]

In the *Flora of Canada*, H.J. Scoggan listed it only from the type locality of Jenkins Lake, Alberta.[4] In his *Flora of the Prairie Provinces*, Bernard Boivin indicated its certain presence only in Alberta but parenthetically included both Saskatchewan and Manitoba, his method of indicating either unsubstantiated reports or his own expectation that the taxon might possibly occur in these provinces although not yet verified.[1]

The first published report of the Yellow Immaculate Lily in Saskatchewan was by Brian Irving, based on his discovery in July 1982 of some yellow lilies on his farm at two local sites nearly a mile apart, about 5 and 5.5 mi. southwest of Kelvington, in SW and NW 23-36-12-W2, respectively.[2] These were growing among numerous normal red-flowered lilies on slightly saline native meadows and consisted of one and two fully yellow and unspotted lilies respectively at the two sites, plus three plants of intermediate colour form at the latter site. They were reportedly visited on 15 July 1982 and verified as the Yellow Immaculate form of the Western Red Wood Lily by J.R. Jowsey, a coauthor of the book *Wildflowers Across the Prairies*.[5]

But earlier, on 28 June 1978, Doris Silcox had discovered a yellow-flowered lily in a patch of red-flowered lilies in a roadside ditch on the s side of former Highway 13, about 4 mi. east-southeast of Carlyle at the ne corner of NW 34-7-2-W2. The site was visited in late June 1979 by Fenton Vance, another coauthor of *Wildflowers Across the Prairies*[5], who verified and photographed the three yellow lilies then present.

Subsequently, in 1983 two yellow lilies were also found by Doris Silcox 2 mi. north of the originally discovered colony, along a roadside ditch 2.5 mi. east of Carlyle in 15-8-2-W2. Later, when road construction threatened the imminent destruction of this site, the two yellow lily plants were transplanted to her yard about 4 mi. east-southeast of Carlyle, at the sw corner of SE 3-8-2-W2.

All of the yellow-flowered lilies observed by Doris Silcox at the Carlyle area sites were the pure Yellow Immaculate Lily form, with pale yellow unspotted perianth parts, growing among typical red-flowered lilies; no apparently intermediate colour forms were noted.

After the publication of his finding of yellow lilies in the Kelvington area, Brian Irving received correspondence from

various other naturalists who had also observed and sometimes photographed such yellow lilies elsewhere in Saskatchewan and adjacent western Manitoba (*pers. comm.* B. Irving to V.L. Harms, Dec. 1988). Each of these respondents was contacted recently by V.L. Harms in an attempt to validate their finds and possibly determine the subsequent history of each yellow lily colony. Based on the information and usually colour photographs kindly provided by these respondents, the following additional locality records for the Yellow Immaculate Lily can now be reported.

Dr. A.J. Porter, of Honeywood Nursery, Parkside, related that in the late 1950s or early 1960s (date uncertain), he had found a yellow native lily about a mile south of the Emerald Lake Regional Park entrance, about 10 mi. south-southeast of Shell Lake, in W 27-48-7-W3. By description and his identification it was the pure Yellow Immaculate Lily form. Later Dr. Porter also found a yellow native lily on his own property about 4 mi. south-southeast of Parkside, in SE 6-48-4-W3. Although definitely yellow, this lily had pinkish-mauve spots on the perianth segments, thus representing an intermediate colour form. Both of the above plants had been transplanted by him to his nursery, where the first plant survived and bloomed for only a couple of years and the second did not survive the transplantation. According to Dr. Porter, this is a difficult species to maintain in cultivation. There are no voucher specimens or colour photographs to further document these sight records (*pers. comm.* A.J. Porter to V.L. Harms, 25 Feb. 1989).

On 5 July 1979, David Meyer, then an archaeologist with the Saskatchewan Research Council, discovered and photographed some yellow lilies among an abundance of typical Western Red Wood Lilies on a hillside on the s side of Gordon Bay of Gordon Lake, between km 30 and 31 of the Pinehouse-Key Lake Road, about 3.5 mi. north of Snake Rapids on the Churchill River (about 1.5 mi. northeast of the ne end of Sandy Lake) at 55°46'44"N, 106°33'30"W. He noted the occurrence here not only of pure yellow lilies but also intermediate-coloured ones with perianth parts either more orange-yellow and/or with some darker spots (*pers. comm.* D. Meyer to B. Irving, 19 Jan. 1984; *pers. comm.* to V.L. Harms, Feb. 1989).

Yellow Immaculate Lily *Doris Silcox*

The Yellow Immaculate Lily has also been found at several sites near The Pas, Manitoba, only 20-30 mi. east of the Saskatchewan border. Mr. R.A. Mitchell (*pers. comm.* R.A. Mitchell to B. Irving, 27 June 1983, and to V.L. Harms, 24 Feb. 1989) indicated that some years ago (date uncertain) he had discovered a yellow lily among a patch of normally-coloured red lilies beside Highway 287 about 4 mi. east of The Pas airport, about 12 mi. northeast of the town of The Pas, Man-

itoba. His colour photograph shows a light yellow unspotted pure Yellow Immaculate Lily form of our native lily.

In June 1983 Mr. W.G. Mitchell discovered some yellow-flowered lilies growing among normal red lilies along Highway 10 about 6 mi. north of The Pas and several more just to the north of the first site, which he photographed. He also found some yellow lilies growing along Highway 287 about 1.3 mi. west of The Pas airport. His colour photograph of a yellow lily north of The Pas, however, shows flowers with the perianth parts bright yellow but with distinct dark red spots, thus being an apparently intermediate form. These yellow lilies were observed in subsequent years, the latest in 1987 (*per. comm.* W.G. Mitchell to B. Irving, 1983, and to V.L. Harms, Feb. 1989).

The yellow lily sites on his farm near Kelvington have been observed by Brian Irving since their discovery in 1982. His first site with a single pure yellow lily did not produce any more yellow lilies in subsequent years. The second site included three plants with pure yellow, unspotted perianth parts (although one of these was a deeper yellow), two plants with yellow perianth segments showing faint grayish spots and one plant with intermediate-coloured, orangish-yellow perianth parts with darker reddish spots, among numerous normally-coloured, reddish-orange-flowered native lilies.[2] This second site continued to produce numerous lilies, including various yellow-flowered plants, from 1982 to 1986. In 1987, a severe spring frost resulted in a poor lily crop with no yellow-flowered plants observed. Again in 1988 there were very few lilies and no apparent yellow forms flowering, probably because of regional drought conditions. In 1988, however, a single plant of intermediate colour form showing yellowish-orange and somewhat spotted perianth parts was found about 1.5 mi. southwest of the latter site at the se corner of SE 21-36-12-W2 (*pers. comm.* B. Irving to V.L. Harms, 5 Dec. 1988).

Brian Irving also indicated that in July 1986 he was with a Saskatchewan Natural History Society tour group that discovered a yellow lily of intermediate form on "Bainbridge Canyon Ridge" (in northeasternmost Pasquia Hills), almost 1 mi. south of the junction of highways 9 and 55 (about 2.5 mi. south of Mountain Cabin Resort and 58 mi. north of Hudson Bay), in SW 17-53-1-W2. His colour photograph of this plant shows a lily flower with yellow but spotted perianth parts (*pers. comm.* B. Irving to V.L. Harms, 5 Dec. 1988).

For a decade following its discovery in the Carlyle area, Doris Silcox has continued to observe and monitor the local natural lily population, including the Yellow Immaculate Lily plants in the roadside ditch across the road south of her home, as well as several lily transplants in her yard. The following 11-year "diary" illustrates the rather precarious existence of such colonies of conspicuous roadside wildflowers, where subjected not only to the vicissitudes of the weather, as has mainly affected the Kelvington population, but also to human disturbances and exploitation:

1978 - one yellow lily in patch of red-flowered lilies.

1979 - three yellow lily plants in patch of red-flowered lilies.

1980 - six yellow lily plants in patch with 129 red-flowered lilies. (One yellow lily plant on a steep clay bank which "washed out," exposing the bulb, was transplanted to yard).

1981 - five yellow lily plants among many red-flowered lilies.

1982 - many lilies initially appeared but the entire patch was cleaned out by the picking of thoughtless travellers.

1983 - fewer lilies appeared and again they were all picked by travellers.

1984 - only one deformed red-flowered lily and no yellow lilies occurred at the roadside ditch site.

1985 - no lilies appeared at the natural roadside ditch site although the three transplanted yellow lilies in the yard developed normally and bloomed.

1986 - again no lilies appeared at the road-

side site, although the three transplanted lilies developed normally and would have bloomed, but on 2 June a hailstorm devastated them.

1987 - the lily patch at the roadside site made a remarkable recovery with 43 red-flowered lilies and 3 yellow lilies. One of the yellow lilies was collected as a voucher specimen for filing in the W.P. Fraser Herbarium, University of Saskatchewan (SASK), to document the distributional record.

1988 - no lilies bloomed at the natural ditch site, presumably because of extreme drought conditions; the three transplanted yellow lilies in yard bloomed well, with one plant bearing three flowers.

Despite their contribution to roadside beauty, it may be unfortunate that these showy wildflowers growing in a roadside ditch of a well-travelled thoroughfare near Carlyle are in such full view of thoughtless passers-by who may pick or dig them up, making quite doubtful their long-term survival here. Elsewhere in Saskatchewan and adjacent Manitoba, the survival of this native yellow lily form similarly appears rather precarious.

The presently known records of the Yellow Immaculate Lily in Saskatchewan and immediately adjacent regions of Manitoba and Alberta are mapped in Figure 1. The general localities appear surprisingly widely spaced, reflecting the highly sporadic occurrence of this yellow lily form within the overall range of the Western Red Wood Lily. Some local clustering is shown, however, by the two or more local colonies present near Carlyle, Kelvington and The Pas. As indicated in the figure and its legend, only the Carlyle area locality record has been documented by an actual voucher specimen as well as colour photographs, while most of the other locality records are substantiated by colour photographs and field verifications alone. The Parkside and Emerald Lake localities represent only sight records, but are based on the identifications of horticulturist A.J. Porter. The Carlyle area voucher specimen and colour photographs from the various other localities reported here are all filed in the W.P. Fraser Herbarium (SASK), University of Saskatchewan, Saskatoon. Despite the lack of voucher specimens for most of the reported localities, they would appear to have been correctly identified as the Yellow Immaculate Lily. The only possible exception might be those of the Kelvington area of the first published Saskatchewan report, which were described by Brian Irving as more vigorous, larger (5-10 cm taller), with their stems thicker, paler green and smoother textured than were the surrounding red-flowered Western Red Wood Lilies, differences not noted elsewhere as characteristic of the Yellow Immaculate Lily form.[2] The colour photographs of the Kelvington yellow lily also seem to reveal perianth parts somewhat thicker and more lustrous-textured than typical for *Lilium philadelphicum*, but although widely spreading, these are not really reflexed. They were, however, verified in the field as the Yellow Immaculate Lily by Dr. J.R. Jowsey in 1982.

A colour form with yellow unspotted perianth parts has also been described and named within the Eastern Red Wood Lily, *Lilium philadelphicum* L. var. *philadelphicum*, as forma *flaviflorum* Williams.[4] The latter, which has been recorded from as far west as Moosehorn, Manitoba, may not be genetically much different from our Yellow Immaculate Lily, perhaps even with the same determining genic alleles that occur instead in plants of the typical var. *philadelphicum*.

The genetic basis for the Yellow Immaculate Lily form is uncertain, but presumably it represents a recessive trait involving one or perhaps more genes. One or more intermediate expressions of perianth colour were often found at various sites including the following: (1) darker orange-yellow but unspotted, (2) pale yellow with faint grayish spots, (3) pale yellow with darker reddish spots and (4) orange-yellow with darker reddish spots.

The authors and the W.P. Fraser Herbarium, University of Saskatchewan, would be interested in details of other possible observations of Yellow Immaculate Lilies in natural habitats.

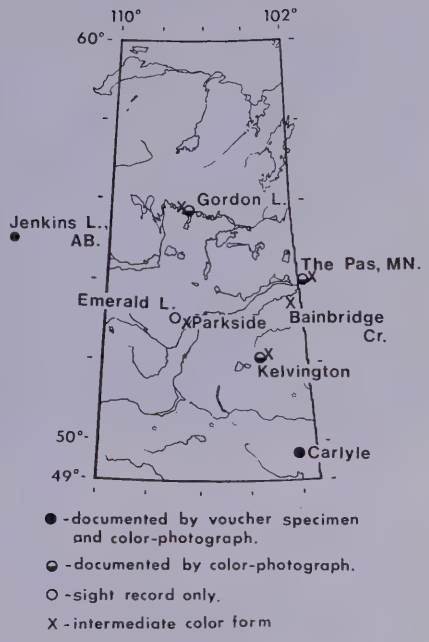


Figure 1. *The known distributional records of the Yellow Immaculate Lily in Saskatchewan and adjacent Alberta and Manitoba.*

ADDENDUM

Recently, with our article already in press, we received a report from Mr. Robert Barnhart that he had discovered about 20 yellow-flowered lilies, including various "half-breed" (i.e. intermediate) forms, among numerous typical red-flowered wild lilies, at four local sites about 4-5 mi. east-southeast and 8-9 mi. east-northeast of Saltcoats, Saskatchewan (specifically, NW 35 & NW 26-23-1-W2 and NW 13 & SE 24-24-33-W1 (*pers. comm.* R. Barnhart to V.L. Harms, 2 July 1989).

[1] BOIVIN, B. 1979. Flora of the prairie provinces. Part IV. *Provancheria* 5, Université Laval, Quebec (Reprinted from Phytologia 42-43).

[2] IRVING, BRIAN. 1983. Color variation in Western Red Lily. *Blue Jay* 41:69-70.

[3] RAUP, H.M. 1934. Phytogeographical studies in the Peace and Upper Liard River regions, Canada, with a catalogue of the vascular plants. Contrib. Arnold Arboretum of Harvard University No. VI. 230 pp.

[4] SCOGGAN, H.J. 1978. Flora of Canada. Part 2. Nat. Mus. of Canada, Ottawa.

[5] VANCE, F.R., J.R. JOWSEY and J.S. MCLEAN. 1977. Wildflowers across the prairies. Western Producer Books, Saskatoon, Saskatchewan.

A FLORISTIC INVENTORY OF A SAND HILLS AREA NEAR SASKATOON, SASKATCHEWAN

BOHDAN PYLYPEC, Department of Crop Science and Plant Ecology, University of Saskatchewan, Saskatoon, Saskatchewan. S7N 0W0

As the last glacial ice retreated across Saskatchewan some 17,000 to 10,000 years ago, a number of glacial lakes formed along the ice front.[1] Sandy deltas originated where water flowed into these lakes. After the lakes disappeared, wind action modified the deltas into dune fields such as the Dundurn Sand Hills which originated along the southern shore of glacial Lake Saskatchewan that existed in the Saskatoon area 14,000 to 11,000 years ago.

Most of the Dundurn Sand Hills have been stabilized by vegetation though small areas still exist where wind erosion and deposition are altering landforms, particularly under disturbed conditions such as those incurred under heavy grazing in times of drought. The complex mosaic of plant communities in the Dundurn Sand Hills reflects the physiographic pattern resulting from present and past geomorphic processes. Four major physiographic areas are present[4]: (i) active complexes where erosion and deposition still occur, (ii) stabilized blowouts (Figure 1) that are saucer-shaped depressions showing evidence of recent erosion but no erosion at present, (iii) stabilized dunes (Figure 2) which show characteristic dune forms but no evidence of recent erosion, and (iv) dune depressions which are located in stabilized dunes and are distinguished from blowouts in that they show no evidence of recent erosion.

This report summarizes the results of a detailed floristic inventory (1986-1988)

Figure 1. *Stabilized blowout covered with mats of Creeping Juniper. B. Pylypec.*

Figure 2. *Stabilized dunes covered with Needle-and-thread, Pasture Sage, Plains Wormwood, Western Snowberry and Chokecherry. B. Pylypec.*

in the Biddulph Natural Area (E½ 12-34-6-W3), a 121 ha tract of land 25 km south of Saskatoon owned by the University of Saskatchewan. Habitats present include the four physiographic areas mentioned above and dominated by stabilized dunes, a treed woodland along a spring-fed creek (Figure 3), a marsh meadow in a seepage area at the edge of the dunes (Figure 4), a small beaver pond and several small areas previously cultivated but now partly covered with native vegetation.

Active complexes characterized by drifting sand and sparse vegetation with deep roots and extensive rhizomes are uncommon in the Dundurn Sand Hills, though earlier air photographs (from 1944, for example) reveal these areas were more extensive in the past. Characteristic species of these areas include Prairie Sunflower, Skeletonweed, Lance-leaved Psoralea, Sand Grass, Indian Rice Grass and Northern Wheatgrass.[3,4] In the stabilized blowouts many of these pioneer species are replaced by Needle-and-thread, June Grass, Sun-loving Sedge, Hairy Golden-aster, Plains Wormwood and Creeping Juniper.

Stabilized dunes constitute the largest area within the Biddulph Natural Area. Xeric species such as Needle-and-thread, Blue Grama, Pasture Sage, Low Sedge, Thread-leaved Sedge, Prickly-pear and Purple Prairie-clover are dominant plants. More mesic sites such as slight depressions and north-facing slopes of the dunes are characterized by Chokecherry, Saskatoon, Western Snowberry, Silverberry and Star-flowered Solomon's Seal.

Dune depressions are dominated by Sun-loving Sedge and Western Snowberry. On some sites Plains Rough Fescue and Western Porcupine Grass, usually found in finer-textured soils, are abundant.

The woodland areas are dominated by Trembling Aspen on the upland sites with Balsam Poplar occurring in lower and moister sites. White Birch and River Birch are present along seepage areas often between the two poplar zones. The understory is characterized by species occurring in aspen parklands, e.g., Saskatoon, Chokecherry, Red-osier Dogwood, High Bush-cranberry, Swamp Red Currant, Smooth Wild Strawberry,

Figure 3. *Aspen dominated woodland along spring-fed creek. Needle-and-thread, Western Snowberry and roses in foreground. B. Pylypec.*

Cream-coloured Vetchling and Western Canada Violet. Species uncommon elsewhere in similar habitats but relatively abundant here include the Western Red Wood Lily, Small Yellow Lady's-slipper, Green-flowered Bog Orchid and Western Jewelweed.

Species from a wide variety of wetland habitats are present in the Biddulph Natural Area. The small beaver pond has open water species, e.g., Lesser Duckweed, Ivy-leaved Duckweed, surrounded by coarse emergents, e.g., Common Cattail, Common Reed Grass, Tall Manna Grass and Smooth Beggarticks. The creek is lined with species associated with running water and wet meadows, e.g., Brook Grass, Water Sedge, Marsh-marigold, Water-parsnip and Snakeroot. Shallow marsh species are present in the marsh meadow area, e.g., Spangletop, Reed Canary Grass, Silverweed, Mountain Sneezeweed, Beaked Willow and Basket Willow.

Several artificially disturbed areas are examples of secondary plant succession. A borrow pit excavated in 1967 for construction of Highway 219 is now covered with White and Yellow Sweet-clovers (introduced), as well as the native pioneer species, Sand Grass. Areas previously cropped by R.C. Biddulph and then seeded to tame forages (Smooth Brome and Crested Wheatgrass) in 1954 and 1955 now also include native species such as Needle-and-thread, Northern Wheatgrass, Western Snowberry, Wood's Rose and Creeping Juniper.

A total of 267 species have been recorded in the Biddulph Natural Area. Voucher specimens have been placed in the W.P. Fraser Herbarium at the University of Saskatchewan.

The wide variety of plant communities represented in this relatively small area, ranging from sparse xeric vegetation on south-facing slopes to mesic woodlands and wetlands, makes this dune area good wildlife habitat. Often areas such as the Biddulph Natural Area are especially valuable since they are surrounded by intensively cultivated agricultural lands. Early man valued these sandy areas, and many of them have numerous interesting archaeological sites.[2,5] Other sand dune areas are scattered throughout the province from the Lake Athabasca Dunes in the north with distinctive

Figure 4. *Marsh meadow in seepage area. Sedges and Reed Canary Grass in foreground; willows, Balsam Poplar and Trembling Aspen in background. B. Pylypec.*

endemic plants[5] to the Great Sand Hills of the southwest. The vegetation of the Biddulph Natural Area resembles the Beaver Creek and Cranberry Flats sites located 10-15 km to the north.

Sand dune areas are exposed to increasingly greater use for consumptive and non-consumptive recreational purposes, cattle grazing and resource extraction, e.g., minerals, oil and gas. Heavy grazing by cattle has a dramatic effect on the plant species composition, leading to decreases in grasses such as Needle-and-thread and increases in Blue Grama, sedges and Prairie Selaginella. Activities such as trampling, all-terrain vehicle use (Figure 5) and grazing can quickly reduce these diverse environments to a simple surface of drifting sand.[2 3] The preservation and careful management of these areas often regarded as wastelands by the general public needs to be recognized.

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Figure 5. *Motocross cycling in Dundurn Sand Hills. J.T. Romo.*

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CHECKLIST OF THE VASCULAR FLORA OF THE BIDDULPH NATURAL AREA

PTERIDOPHYTA - Ferns and fern allies

EQUISETACEAE - Horsetail family
Equisetum arvense L. - Common horsetail
Equisetum hyemale L. var. *affine* (Engelm.) A.A. Eaton - Common scouring-rush
Equisetum laevigatum A.Br. - Smooth scouring-rush

SELAGINELLACEAE - Spike-moss family
Selaginella densa Rydb. - Prairie selaginella

SPERMATOPHYTA - Seed-bearing plants

GYMNOSPERMAE - Conifers

CUPRESSACEAE - Cypress family
Juniperus communis L. - Low juniper
Juniperus horizontalis Moench - Creeping juniper

ANGIOSPERMAE - Flowering plants

MONOCOTYLEDONAE - Monocotyledons

TYPHACEAE - Cattail family
Typha latifolia L. - Common cattail

SPARGANIACEAE - Bur-reed family
Sparganium sp. - Bur-reed

ALISMACEAE - Water-plantain family
Alisma plantago-aquatica L. - Common water-plantain

POACEAE - Grass family
Agropyron albicans Scribn. & Smith - Awned northern wheatgrass
Agropyron dasystachyum (Hook.) Scribn. var. *dasystachyum* - Northern wheatgrass
Agropyron dasystachyum (Hook.) Scribn. var. *riparium* (Scribn. & Smith) Bowden - Streambank wheatgrass
Agropyron pectiniforme Roem. & Schult. - Crested wheatgrass
Agropyron repens (L.) Beauv. - Quack grass
Agropyron subsecundum (Link) Hitchc. - Awned wheatgrass
Agrostis exarata Trin. - Spike redtop
Agrostis scabra Willd. - Rough hair grass
Beckmannia syzigachne (Steud.) Fern. - Slough grass
Bouteloua gracilis (HBK.) Lag. - Blue grama
Bromus ciliatus L. - Fringed brome
Bromus inermis Leyss. - Smooth brome
Calamagrostis canadensis (Michx.) Beauv. - Marsh reed grass
Calamovilfa longifolia (Hook.) Scribn. - Sand grass
Catabrosa aquatica (L.) Beauv. - Brook grass
Elymus canadensis L. - Canada wild rye
Festuca altaica Trin. ssp. *hallii* (Vasey) Harms - Plains rough fescue
Festuca ovina L. - Sheep Fescue
Glyceria grandis S. Wats. - Tall manna grass
Glyceria striata (Lam.) Hitchc. - Fowl manna grass
Helictotrichon hookeri (Scribn.) Henr. - Hooker's oat grass
Hordeum jubatum L. - Wild barley
Koeleria cristata (L.) Pers. - June grass
Muhlenbergia richardsonis (Trin.) Rydb. - Mat muhly
Oryzopsis asperifolia Michx. - White-grained mountain rice grass
Oryzopsis hymenoides (Roem. & Schult.) Ricker - Indian rice grass

Phalaris arundinacea L. - Reed canary grass
Phragmites communis Trin. - Common reed grass
Poa canbyi (Scribn.) Piper - Canby blue grass
Poa cusickii Vasey - Early blue grass
Poa interior Rydb. - Wood blue grass
Poa pratensis L. - Kentucky blue grass
Poa sandbergii Vasey - Sandberg's blue grass
Schizachne purpurascens (Torr.) Swallen - Purple oat grass
Schizachyrium scoparium (Michx.) Nash - Little bluestem
Scolochloa festucacea (Willd.) Link - Spangletop
Sporobolus cryptandrus (Torr.) A. Gray - Sand dropseed
Stipa comata Trin. & Rupr. - Needle-and-thread
Stipa curtiseta (A.S. Hitchc.) Barkworth - Western porcupine grass
Stipa viridula Trin. - Green needle grass

CYPERACEAE - Sedge family
Carex aquatilis Wahl. - Water sedge
Carex eleocharis Bailey - Low sedge
Carex filifolia Nutt. - Thread-leaved sedge
Carex hystricina Muhl. - Porcupine sedge
Carex obtusata Lilj. - Blunt sedge
Carex pensylvanica Lam. var. *digyna* Boeckl. - Sun-loving sedge
Carex rostrata Stokes - Beaked sedge
Carex sartwellii Dewey - Sartwell's sedge
Carex siccata Dewey - Hay sedge
Carex sprengelii Dewey - Sprengel's sedge
Carex stipata Muhl. - Awl-fruited sedge
Scirpus microcarpus Pers. - Small-fruited bulrush
Scirpus validus Vahl - Great bulrush

LEMNACEAE - Duckweed family
Lemna minor L. - Lesser duckweed
Lemna trisulca L. - Ivy-leaved duckweed

JUNCACEAE - Rush family
Juncus balticus Willd. - Baltic rush

LILIACEAE - Lily family
Allium textile Nels. & Macbr. - Prairie onion
Asparagus officinalis L. - Asparagus
Disporum trachycarpum (S. Wats.) Benth. & Hook. - Fairybells
Lilium philadelphicum L. var. *andinum* (Nutt.) Ker. - Western red wood lily
Maianthemum canadense Desf. var. *interius* Fern. - Two-leaved Solomon's seal
Smilacina stellata (L.) Desf. - Star-flowered Solomon's seal
Smilax lasioneuron Hook. - Carrion-flower

IRIDACEAE - Iris family
Sisyrinchium montanum Greene - Common blue-eyed grass

ORCHIDACEAE - Orchid family
Cypripedium calceolus L. var. *parviflorum* (Salisb.) Fern. - Small yellow lady's-slipper
Platanthera hyperborea (L.) Lindl. - Green-flowered bog orchid

DICOTYLEDONAE - Dicotyledons

SALICACEAE - Willow family
Populus balsamifera L. - Balsam poplar
Populus tremuloides Michx. - Trembling aspen
Salix bebbiana Sarg. - Beaked willow
Salix exigua Nutt. ssp. *interior* (Rowlee) Cronq. - Sandbar willow
Salix lutea Nutt. - Yellow willow
Salix petiolaris J.E. Smith - Basket willow

BETULACEAE - Birch family
Betula glandulifera (Regel) Butler - Swamp birch
Betula occidentalis Hook. - River birch
Betula papyrifera Marsh. - White birch

URTICACEAE - Nettle family
Urtica dioca L. var. procera (Muhl.) Wedd. - Stinging nettle

SANTALACEAE - Sandalwood family
Comandra umbellata (L.) Nutt. var. pallida (DC.) M.E. Jones - Pale comandra

POLYGONACEAE - Buckwheat family
Polygonum amphibium L. var. stipulaceum (Coleman) Fern. - Water smartweed
Polygonum aviculare L. - Doorweed
Polygonum convolvulus L. - Wild buckwheat
Rumex occidentalis S. Wats. - Western dock

CHENOPODIACEAE - Goosefoot family
Axyris amaranthoides L. - Russian pigweed
Chenopodium album L. - Lamb's-quarters
Chenopodium pratericola Rydb. - Narrow-leaved goosefoot
Corispermum orientale Lam. var. *emarginatum* (Rydb.) Macbr. - Villose bugseed

Salsola kali L. var. *tenuifolia* Tausch. - Russian thistle

NYCTAGINACEAE - Four o'clock family
Mirabilis hirsuta (Pursh) MacM. var. *hirsuta* - Hairy umbrellawort

CARYOPHYLLACEAE - Pink family
Cerastium arvense L. - Field chickweed
Stellaria longifolia Muhl. - Long-leaved stitchwort
Stellaria longipes Goldie - Long-stalked stitchwort

RANUNCULACEAE - Crowfoot family
Actaea rubra (Ait.) Willd. forma *neglecta* (Gilman) Robins - White baneberry
Actaea rubra (Ait.) Willd. forma *rubra* - Red baneberry
Anemone canadensis L. - Canada anemone
Anemone patens L. var. *wolfgangiana* (Bess.) Koch - Crocus anemone
Anemone riparia Fern. - Tall anemone
Caltha palustris L. - Marsh-marigold
Ranunculus glaberrimus Hook. - Shiny-leaved buttercup
Ranunculus macounii Britt. - Macoun's buttercup
Ranunculus scleratus L. - Celery-leaved buttercup
Thalictrum venulosum Trel. - Veiny meadow-rue

BRASSICACEAE - Mustard family
Arabis hirsuta (L.) Scop. var. *pycnocarpa* (Hopkins) Rollins - Hirsute rock cress
Arabis holboellii Hornem. var. *retrofracta* (Graham) Rydb. - Reflexed rock cress
Descuraina pinnata (Walt.) Britt. var. *brachycarpa* (Richards.) Fern. - Short-fruited tansy mustard
Descuraina sophia (L.) Webb. - Flixweed
Erysimum asperum (Nutt.) DC. - Western wallflower
Erysimum cheiranthoides L. - Wormseed mustard
Lepidium densiflorum Schrad. - Common pepper-grass
Lesquerella arenosa (Richards.) Rydb. - Sand bladderpod
Rorippa palustris (L.) Besser var. *fernaldiana* (Butters) Stuckey - Marsh yellow cress
Thlaspi arvense L. - Stinkweed

SAXIFRAGACEAE - Saxifrage family
Heuchera richardsonii R. Br. - Alumroot
Parnassia palustris L. var. *tenuis* Wahl. - Northern grass-of-parnassus

GROSSULARIACEAE - Currant family
Ribes hudsonianum Richards. - Northern black currant
Ribes oxyacanthoides L. - Northern gooseberry
Ribes triste Pall. - Swamp red currant

ROSACEAE - Rose family
Amelanchier alnifolia Nutt. - Saskatoon
Crataegus chrysocarpa Ashe - Round-leaved hawthorn
Fragaria virginiana Dcne. ssp. *glauca* (S. Wats.) Staudt - Smooth wild strawberry
Geum aleppicum Jacq. - Yellow avens
Geum triflorum Pursh - Three-flowered avens
Potentilla anserina L. - Silverweed
Potentilla arguta Pursh - White cinquefoil
Potentilla norvegica L. ssp. *monspeliensis* (L.) Asch. & Graebn. - Rough cinquefoil
Potentilla pensylvanica L. var. *atrovirens* (Rydb.) T. Wolf - Prairie cinquefoil
Potentilla pensylvanica L. var. *pensylvanica* - Prairie cinquefoil
Potentilla rivalis Nutt. - Brook cinquefoil
Prunus pensylvanica L.f. - Pincherry
Prunus virginiana L. - Chokecherry
Rosa acicularis Lindl. - Prickly rose
* *Rosa arkansana* Porter - Low prairie rose
Rosa woodsii Lindl. var. *fendleri* (Crepin) Rydb. - Wood's rose
Rosa woodsii Lindl. var. *terrens* (Lunnell) Breitung - Wood's rose
Rosa woodsii Lindl. x *Rosa acicularis* Lindl. - "Hybrid" rose
Rubus idaeus L. var. *strigosus* (Michx.) Maxim - Wild red raspberry
Rubus pubescens Raf. - Dewberry
Spiraea alba Du Roi - Narrow-leaved meadowsweet

FABACEAE - Legume family
Astragalus adsurgens Hook. - Ascending purple milk-vetch
Astragalus agrestis Dougl. - Purple milk-vetch
Caragana arborescens Lam. - Common caragana
Glycyrrhiza lepidota (Nutt.) Pursh - Wild licorice
Lathyrus ochroleucus Hook. - Cream-coloured vetchling
Lathyrus venosus Muhl. - Wild peavine
Medicago sativa L. - Alfalfa
Melilotus alba Medic. - White sweet-clover
Melilotus officinalis (L.) Pall. - Yellow sweet-clover

Oxytropis campestris (L.) DC. var. *gracilis* - Late yellow locoweed
Oxytropis sericea Nutt. var. *spicata* (Hook.) Barneby - Early yellow locoweed
Petalostemon purpureum (Vent.) Rydb. - Purple prairie-clover
Psoralea argophylla Pursh - Silverleaf psoralea
Psoralea esculenta Pursh - Indian breadroot
Psoralea lanceolata Pursh - Lance-leaved psoralea
Thermopsis rhombifolia (Nutt.) Richardson - Golden-bean
Vicia americana Muhl. var. *americana* - American vetch
Vicia americana Muhl. var. *angustifolia* Nees - Narrow-leaved vetch

LINACEAE - Flax family
Linum lewisii Pursh - Lewis wild flax
Linum rigidum Pursh - Large-flowered yellow flax

BALSAMINACEAE - Touch-me-not family
Impatiens noli-tangere L. - Western jewelweed

ANACARDIACEAE - Sumach family
Rhus radicans L. var. *rydbergii* (Small) Rehder - Poison-ivy

ACERACEAE - Maple family
Acer negundo L. - Manitoba maple

RHAMNACEAE - Buckthorn family
Rhamnus alnifolia L'Her. - Alder-leaved buckthorn

VIOLACEAE - Violet family
Viola adunca J.E. Smith - Early blue violet
Viola nephrophylla Greene - Northern bog violet
Viola nuttallii Pursh - Nuttall's yellow violet
Viola rugulosa Greene - Western Canada violet

OPUNTIACEAE - Cactus family
Coryphantha vivipara (Nutt.) Britt. & Rose - Ball cactus
Opuntia fragilis (Nutt.) Haw. - Brittle-prickly pear
Opuntia polyacantha Haw. - Prickly-pear

ELAEAGNACEAE - Oleaster family
Elaeagnus commutata Bernh. - Silverberry
Shepherdia argentea Nutt. - Buffaloberry

OENOTHERACEAE - Evening-primrose family
Epilobium ciliatum Raf. - Northern willowherb
Gaura coccinea Pursh - Scarlet gaura
Oenothera nuttallii Sweet - White evening-primrose
Oenothera serrulata Nutt. - Shrubby evening-primrose

ARALIACEAE - Ginseng family
Aralia nudicaulis L. - Wild sarsaparilla

APIACEAE - Parsley family
Cicuta maculata L. var. *angustifolia* Hook. - Water-hemlock
* *Cymopterus acaulis* (Pursh) Raf. - Plains cymopterus
Osmorhiza longistylis (Torr.) DC. - Smooth sweet cicely
Sanicula marilandica L. - Snakeroot
Sium suave Walt. - Water-parsnip
Zizia aptera (Gray) Fern. - Heart-leaved alexanders

CORNACEAE - Dogwood family
Cornus canadensis L. - Bunchberry
Cornus sericea L. ssp. *stolonifera* (Michx.) Fosberg - Red osier dogwood

PYROLACEAE - Wintergreen family
Pyrola asarifolia Michx. - Pink wintergreen

ERICACEAE - Heath family
Arctostaphylos uva-ursi (L.) Spreng. - Bearberry

PRIMULACEAE - Primrose family
Androsace septentrionalis L. - Pygmyflower
Lysimachia ciliata L. - Fringed loosestrife
Lysimachia thyrsiflora L. - Tufted loosestrife

OLEACEAE - Olive family
Fraxinus pennsylvanica Marsh. var. *subintegerrima* (Vahl.) Fern. - Green ash

APOCYNACEAE - Dogbane family
Apocynum androsaemifolium L. var. *incanum* DC. - Spreading dogbane

ASCLEPIADACEAE - Milkweed family
Asclepias ovalifolia Dcne. - Dwarf milkweed
Asclepias viridiflora Raf. var. *linearis* (A. Gray) Fern. - Green milkweed
Asclepias viridiflora Raf. var. *oborata* (Ell.) Torrey - Green milkweed

POLEMONIACEAE - Phlox family
Phlox hoodii Richardson - Moss phlox

BORAGINACEAE - Borage family
Hackelia deflexa (Wahlenb.) Opiz. var. *americana* (Gray) Fern. & I.M. Johnston - Nodding stickseed
Lappula redowskii (Hornem.) Greene - Western blue bur
Lithospermum incisum Lehm. - Narrow-leaved puccoon

LAMIACEAE - Mint family
Mentha arvensis L. - Field mint
Monarda fistulosa L. - Wild bergamot
Scutellaria galericulata L. - Marsh skullcap
Stachys palustris L. var. *pilosa* (Nutt.) Fern. - Marsh hedge-nettle

SCROPHULARIACEAE - Figwort family
Penstemon gracilis Nutt. - Lilac-flowered beardtongue
Penstemon nitidus Dougl. - Smooth blue beardtongue
Veronica americana (Raf.) Schwein. - American speedwell
* *Veronica catenata* Pennell - Water speedwell
Veronica scutellata L. - Marsh speedwell

OROBANCHACEAE - Broom-rape family
Orobanche ludoviciana Nutt. - Louisiana broom-rape

PLANTAGINACEAE - Plantain family
Plantago major L. - Common plantain

RUBIACEAE - Madder family
Galium boreale L. - Northern bedstraw
* *Galium trifidum* L. - Small bedstraw
Galium triflorum Michx. - Sweet-scented bedstraw

CAPRIFOLIACEAE - Honeysuckle family
Linnaea borealis L. ssp. *americana* (Forbes) Hulten - Twinflower
Lonicera dioica L. var. *glaucescens* (Rydb.) Butters. - Twining honeysuckle
Symphoricarpos albus (L.) Blake - White snowberry
Symphoricarpos occidentalis Hook. - Western snowberry
Viburnum edule (Michx.) Raf. - Low bush-cranberry
Viburnum opulus L. ssp. *trilobum* Marsh. - High bush-cranberry

CAMPANULACEAE - Bluebell family
Campanula rotundifolia L. - Harebell

ASTERACEAE - Composite family
Achillea lanulosa Nutt. - Common yarrow
Agoseris glauca (Pursh) Raf. - False dandelion
Antennaria aprica Greene - Low everlasting
Artemisia biennis Willd. - Biennial wormwood
Artemisia campestris L. - Plains wormwood
Artemisia frigida Willd. - Pasture sage
Artemisia ludoviciana Nutt. var. *gnaphalodes* (Nutt.) T.&G. - Slender sage
Aster ericoides L. ssp. *pansus* (Blake) A.G. Jones - Many-flowered aster
Aster hesperius A. Gray - Willow aster
Aster laevis L. ssp. *geyeri* A. Gray - Smooth aster
Bidens cernua L. - Smooth beggarticks
Carduus nutans L. - Nodding thistle
Cirsium arvense (L.) Scop. - Canada thistle
Cirsium flodmanii (Rydb.) Arthur - Flodman's thistle
Crepis tectorum L. - Narrow-leaved hawk's-beard
Erigeron asper Nutt. - Rough fleabane
Erigeron caespitosus Nutt. - Tufted fleabane
Erigeron philadelphicus L. - Philadelphia fleabane
Gaillardia aristata Pursh - Great-flowered gaillardia
Grindelia squarrosa (Pursh) Dunal - Gumweed
Gutierrezia sarothrae (Pursh) Britt. & Rusby - Common broomweed
Helenium autumnale L. - Mountain sneezeweed
Helianthus laetiflorus Pers. var. *subrhomboideus* (Rydb.) Fern. - Beautiful sunflower
Helianthus petiolaris Nutt. - Prairie sunflower
Heterotheca villosa (Pursh) Shinners - Hairy golden-aster
Hieracium umbellatum L. - Canada hawkweed
Lactuca pulchella (Pursh) DC. - Blue lettuce
Liatris punctata Hook. - Dotted blazingstar
Lygodesmia juncea (Pursh) D. Don - Skeletonweed
Petasites frigidus (L.) Fries var. *nivalis* (Greene) Cronq. - Vine-leaved colt's-foot
Petasites sagittatus (Pursh) A. Gray - Arrow-leaved colt's foot
Prenanthes racemosa Michx. - Glaucous white lettuce

Senecio canus Hook. - Silvery groundsel
Senecio integerrimus Nutt. var. *integerrimus* - Entire-leaved groundsel
Solidago canadensis L. var. *gilvocanescens* Rydb. - Canescent goldenrod
Solidago gigantea Ait. var. *serotina* (Ait.) Cronq. - Late goldenrod
Solidago missouriensis Nutt. - Low goldenrod
Solidago nemoralis Ait. var. *longipetiolata* (Mack. & Bush) - Showy goldenrod
Solidago spathulata DC. var. *neomexicana* (Rydb.) Cronq. - Mountain goldenrod
Sonchus arvensis L. - Perennial sow-thistle
Taraxacum officinale Weber - Common dandelion
Townsendia exscapa (Rich.) Porter - Low townsendia
Tragopogon dubius Scop. - Yellow goat's-beard

*Voucher specimens in W.P. Fraser Herbarium collected by earlier investigators.

A SELECTED, ANNOTATED BIBLIOGRAPHY FOR SASKATCHEWAN BUTTERFLY WATCHERS

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The first part of this article (10 titles) is intended to help Saskatchewan butterfly watchers decide which identification guides will help them most to determine what butterflies they are seeing or catching. Most of these books also treat the ecology of each species, in varying detail. As with bird guides, the more butterfly books one has, the better the chance of identifying the more difficult species. The second part (five titles) deals with butterfly watching and biology in general. Prices are approximate and sometimes vary from store to store; all are available from the Blue Jay Bookshop.

Monarch - *Gary Seib*

BUTTERFLIES OF SASKATCHEWAN — A FIELD GUIDE. Ronald R. Hooper. 1973. Saskatchewan Museum of Natural History, Regina. 216 pp. (114 x 172 mm) $3.75.

This little unassuming publication illustrates pinned individuals of all species known to occur in the province at that time in 81 black and white plates; living specimens of 18 species are also shown in colour. Usually upper surfaces are shown for male and female and the under surface for one or the other (whole butterflies are illustrated). A useful feature of the book is the keys to identifying species. Each butterfly has a half page of text, facing the photographs, with paragraphs on appearance, range (incl. period found) and habits. This guide is complete, but lack of colour is a problem for some species.

Revised Checklist of Saskatchewan Butterflies. Ronald R. Hooper. September, 1986. Pages 154-163 in Vol. 44, No. 3 of *Blue Jay* (Saskatchewan Natural History Society).

Updated from the 1973 book, this article includes scientific and common names and geographical distributions for 144 species. This list has been used to evaluate how completely the identification guides below cover Saskatchewan species. [The author has prepared a four-page summary of Hooper's paper, entitled "Seasonal and Geographical Distribution of Saskatchewan Butterflies" (1987). One line for each species presents a calendar showing the flight period, the common (English) name, in alphabetical order, provincial distribution and the pages for text and plate numbers in the Audubon field guide (reference below). Anyone wishing a copy may obtain it free by sending me a stamped self-addressed envelope.]

The sequence of the guides below is in order of their completeness in illustrating Saskatchewan species, particularly in colour.

THE BUTTERFLIES OF NORTH AMERICA. A NATURAL HISTORY AND FIELD GUIDE. J. A. Scott. 1986. Stanford University Press, Stanford, CA. 583 pp. (200 x 259 mm) $65.00.

This volume begins with a 110-page section on biology and ecology, followed by keys for identifying eggs, larvae, pupae and adults to family, in most cases. All 679 species of North American butterflies (north of Mexico) are shown in more than 1800 photos of pinned specimens (half butterflies) in 42 plates. Up to 12 pictures are given for a species and its subspecies. An additional 22 plates depict living butterflies and their immature stages. The arrangement is basically by colour and pattern. The underside is always shown and the upperside usually. There are from 1/4 to 2 pages of text per species which cover habitat, larval host plants, eggs, larvae, pupae and life history of the adult. A map shows province/state distribution and a Saskatchewan list can be built up from the maps. Appendices include studying butterflies, a brief bibliography, glossary, indices to host plants and butterflies. Unfortunately, practically all of the illustrations are identified by scientific name only. While it may be too bulky as a field guide, this is the best handbook currently available. *All Saskatchewan species are shown in colour, but not all subspecies.*

AUDUBON FIELD GUIDE TO NORTH AMERICAN BUTTERFLIES. R. M. Pyle. 1981. Knopf, New York. 924 pp. (102 x 195 mm) $20.50.

There are 707 plates (three per page) of living butterflies. The book is organized taxonomically which, while it puts the somewhat similar members of a family together, does not group species of similar colour. There is a single plate for each of almost 2/3 of the Saskatchewan species, but most of these include two photos, showing upper- and underwing. Because the pictures are of living insects, the angle and details are not always the best. There is almost a page of text per species with paragraphs

on description, similar species, life cycle, flight (period), habitat, range and remarks. *One hundred thirty-five Saskatchewan species are shown in colour; six are shown only in black-and-white and three are discussed but not illustrated.* (The black-and-whites are: Persius Dusky-wing, Freija's Fritillary, Northern Marble-wing, Plains Gray and Orange Roadside skippers and Great Northern Sulphur. The three are: Afranius Dusky-wing, Oslar's Roadside Skipper and Kahli Swallowtail.)

BUTTERFLIES OF MANITOBA. Paul Klassen, A.R. Westwood, W.B. Preston and W.B. McKillop. 1989. Manitoba Museum of Man and Nature, Winnipeg. 290 pp. (204 x 254 mm) $21.95.

All 144 kinds of Manitoba butterflies are illustrated with colour photographs of pinned specimens (whole butterflies). The images are larger than in other books and there are up to seven for a species. There is about a page of text for each species dealing with description, similar species, life cycle, habitat, range, Manitoba records, subspecies and remarks; a provincial distribution map is included. Appendices cover collecting techniques and guidelines, index of food plants, checklist, location of collection sites and flight periods of each species. A five-page list of references and a glossary is included. A useful feature of this volume is the listing of alternate scientific names for species, often necessary for finding a species in another book. Two major drawbacks are that the plates are identified by and the butterfly index is given in scientific names only. *Twenty-nine Saskatchewan butterflies are not illustrated.* (Of the species not illustrated in the Audubon guide, only Kahli's Swallowtail is shown here — male and female, ventral and dorsal.)

FIELD GUIDE TO WESTERN BUTTERFLIES. (#33 in the Peterson Field Guide Series) J. W. Tilden and A. C. Smith. 1986. Houghton Mifflin, Boston. 370 pp. (114 x 182 mm) $22.95.

Photographs are of pinned specimens in 48 plates (half in colour), usually upper and lower surfaces of wings (half butterflies). Arrows on the illustrations point to distinctive field marks — a definite advantage. Text is usually 1/3 to 1/2 page with headings for identification, early stages, food, adults (dates), range, habitat, subspecies and remarks. Included are a glossary, bibliographies on various subjects, directories of supply houses and organizations with their publications and indices to host plants and butterflies, in English and scientific names. *Six Saskatchewan species are not pictured and only half of those illustrated are in colour.* (Missing are Harris' Checkerspot, Edward's and Red-banded hairstreaks, Least and Labrador skippers, and Kahli Swallowtail.) (Afranius Dusky-wing and Oslar's Roadside Skipper, not illustrated in the Audubon Guide, are shown here in black-and-white.)

White Admiral *Bernie Gollop*

FIELD GUIDE TO THE BUTTERFLIES OF NORTH AMERICA, EAST OF THE ROCKIES. (#4 in the Peterson Field Guide Series) A. B. Klots. 1951. Houghton Mifflin, Boston. 349 pp. (121 x 192 mm) $19.95.

A mixture of black-and-white photos and coloured paintings of pinned specimens (upper and lower views in most cases) in 34 plates. Arrows point out field marks. Species text deals with description, similar species, larva, food, flight period, range and subspecies. Chapters

cover collecting and preserving, the butterfly's environment, life histories and growth, adult butterfly, classification, indices to host plants and butterflies. *Fifty-eight Saskatchewan species are not pictured.*

BUTTERFLIES AND MOTHS. R. T. Mitchell and H. S. Zim. 1987 Revised. Golden Press, New York. 160 pp. (102 x 153 mm) $4.95.

Butterflies occupy the first 80 pages of this volume of the Golden Nature Guides. Paintings of natural poses more often show male and female, less often upper- and undersides, and seldom both aspects of both sexes. Some species have only a single image. Text is sparse. Most species have range maps and some illustrations of larvae and pupae. The arrangement is taxonomic. *Sixty-three of Saskatchewan's 144 species are not illustrated.*

AN INSTANT GUIDE TO BUTTERFLIES. Pamela Forey and Cecilia Fitzsimons. 1987. Bonanza Books, New York. 124 pp. (106 x 178 mm) $12.00.

Paintings show adults in natural poses, often with caterpillars. However, the presentation is uneven — sometimes only one image, sometimes two (male and female or upper and lower), sometimes three. The organization is by colour, which is an advantage. There is one page per species, the text covering description, larvae and food plants, ecology and similar species. A map shows distribution by 10 regions for North America; Saskatchewan and Manitoba are combined into one region. There are no scientific names and some of the English names appear to be unique. *Sixty-eight Saskatchewan species are not shown.*

BUTTERFLIES OF NORTH DAKOTA; AN ATLAS AND GUIDE. A. A. Royer. 1988. Science Monograph 1, Division of Science, Minot State University, Minot, ND. 192 pp. $19.00. Not seen.

The following two out-of-print books are particularly useful, although the lack of English names and the use of often outdated scientific names causes problems.

BUTTERFLIES OF NORTH AMERICA. W. H. Howe. 1975. Doubleday, Garden City, NY. 633 pp. (187 x 267 mm)

There are 2093 paintings of pinned specimens in 97 plates. (A painting usually consists of an upper and lower view of half butterflies.) The organization is taxonomic with much attention to subspecies. As a result, there are up to 26

Purple Lesser Fritillary *Wayne Harris*

paintings of one species. Seventy-four pages are devoted to ecology and collecting. There are a glossary, bibliography, indices to host plants and butterflies. *All Saskatchewan species are shown and in only four cases the appropriate subspecies is not illustrated (although they are discussed) — Acmon Blue, American Copper, Acadian & Gray hairstreaks.*

HOW TO KNOW THE BUTTERFLIES. P. R. and A. H. Ehrlich. 1961. W. C. Brown, Dubuque, Iowa. 262 pp. (150 x 218 mm)

This is one of at least 33 volumes in the Pictured-Key Nature Series. It is a book of dichotomous keys — keys that offer two choices in each of a series of steps; whichever alternative fits the butterfly in one step determines which step will come next — without colour, although the aspect of each species critical to identification is usually drawn. Skippers (incl. Dash, Dusky- and Cloudywings) are not included. Otherwise *all Saskatchewan species are keyed out except for two that were apparently not recognized as species when the book was written — Kahli Swallowtail and Western White.*

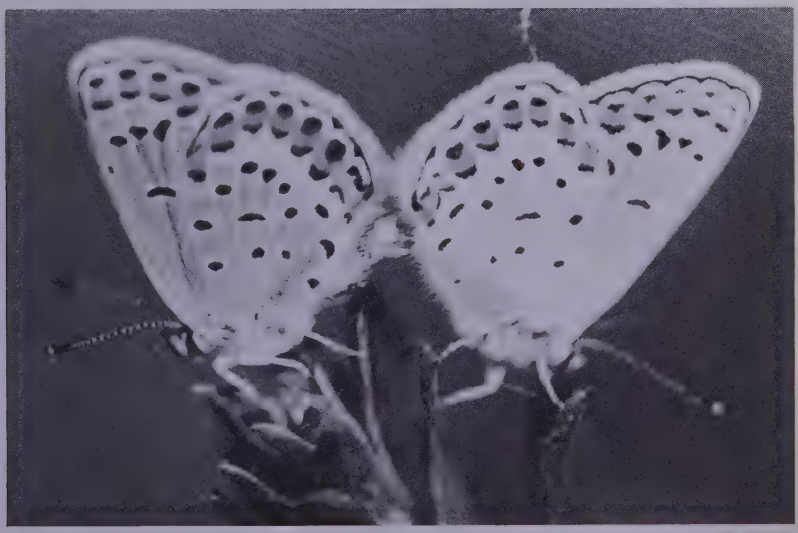
NATURAL HISTORY

THE AUDUBON SOCIETY HANDBOOK FOR BUTTERFLY WATCHERS (A guide to observing, locating, identifying, studying and photographing butterflies). R. M. Pyle. 1984. Scribner's, New York. 274 pp. (200 x 260 mm) $26.95.

Among its 19 chapters are: Why watch butterflies/ About butterflies/ Butterfly watching equipment/ Counting butterflies/ Butterfly behaviour/ Butterfly gardening/ Rearing butterflies/ Butterfly photography/ Great North American butterfly spots. An excellent survey for the butterfly hobbyist.

THE NATURAL HISTORY OF BUTTERFLIES. John Feltwell. 1986. Croom Helm, London. 133 pp. (164 x 242 mm) $27.00.

Chapters discuss fossils and butterfly hunters, structure and function, life cycles, food plants, coloration and camouflage, habitats, butterflies and sunshine, populations and territories, migration and conservation. Examples are drawn from the butterflies of Europe and its American visitors.



Orange Bordered (Melissa) Blues *Fred Lahrman*

BUTTERFLY AND MOTH. (Eyewitness Books) Paul Whalley. 1988. Stoddart, Toronto. 64 pp. (225 x 288 mm) $14.95.

Profusely illustrated with photos and paintings in colour, this book gives a brief, basic understanding of butterfly life history. It devotes two pages of pictures and text to each of such topics as courtship and egg laying, emerging caterpillar, caterpillar to pupa, pupa stage, emerging butterfly, migration and hibernation, camouflage, mimicry, endangered species, etc., based on examples from around the world.

THE LIVES OF BUTTERFLIES. M.M. Douglas. 1986. University of Michigan Press, Ann Arbor. 241 pp. (151 x 236 mm).

A book for the "interested reader and professional." Chapters deal with evolution, immature stages and adults, communities, migration, parasites, predators, mating, host plants. A 7-page glossary, 18-page bibliography and an index conclude the volume.

THE YEAR OF THE BUTTERFLY. George Ordish. 1975. Scribner's, New York. 147 pp.

A fictionalized account of two monarch butterflies beginning as newly hatched caterpillars and following them from August through July. It is based on the great body of scientific research done on this species.

Tiger Swallowtails *Larry Morgotch*

SKIPPERS AND BUTTERFLIES OF THE PINAWA-LAC DU BONNET REGION, SOUTHEASTERN MANITOBA

PETER TAYLOR, Box 597, Pinawa, Manitoba. R0E 1L0

Introduction

This is a summary of butterfly observations, mainly sight records, made in the Pinawa-Lac du Bonnet region of Manitoba between 1976 and 1988. Unless otherwise stated, sightings were by the author alone. Binoculars were usually used as an aid to identification. Some records were confirmed photographically; pictures of some of the less common species accompany this article. Record-keeping was sporadic from 1976 to 1985 and more systematic in the next three years.

The most recent checklist of Manitoba butterflies was published in 1984 by Klassen.[4] The list below follows the same sequence, but includes several recent changes. The changes were made in consultation with Klassen et al., to be consistent with both English and scientific names in Butterflies of Manitoba.[5] With two exceptions, subspecies are not given here; those occurring in southeastern Manitoba are given by Klassen.[4]

The study area is shown in the map, Figure 1. Abundance estimates are based on records within the circle, 25 km radius, centred at the junction of Manitoba Highway 11 and Provincial Road 211 (the Pinawa road). The flight dates include a few records from up to 15 km farther afield.

The relationship between the areas covered by this and previous lists is shown in Figure 1. In 1972, Masters published two annotated lists, excluding skippers, for Whiteshell Provincial Park and for Grand Beach Provincial Park and Belair Forest Reserve (now Provincial Forest), as well as simple lists for Northwest Angle and Sandilands Provincial Forests.[7 8 9 10] These papers include some information previously published by Bird, Brodie, and Brooks.[1 2 3] The present study area just overlaps the western edge of the Whiteshell park.

The principal geographic features and habitat types of the Pinawa-Lac du Bonnet region have been described elsewhere.[6 13] The study area is in the boreal forest at the edge of the Canadian shield, at an elevation of 240-300 m. It straddles the divide between the Winnipeg River and Brokenhead River drainages; both rivers flow into Lake Winnipeg. The dividing feature is a low sandy ridge, known locally as Milner Ridge, which is also the name of a hamlet (Fig. 1). The ridge originated as a beach of glacial Lake Agassiz; it is part of a beach-ridge complex extending from Lake Winnipeg to northern Minnesota, sometimes referred to as La Petite Montagne des Cypres.[9]

There is little surface relief in the land, but small changes in elevation can result in dramatic changes in habitat. Well-drained rock outcrops and sandy ridges are clad mainly in Jack Pine, while most wet, low-lying areas are dominated by Tamarack and Black Spruce. Intervening areas have a lot of deciduous trees, mainly Trembling Aspen, with some White Birch and Balsam Poplar, as well as White Spruce. Bur Oak, Black and Green Ash, and American Elm are more localized. There are also numerous marshes, bogs and fens, some like the Whitemouth Bog (5 km northeast of Whitemouth) being very extensive. Much forest has been converted to farmland, especially between Elma and Lac du Bonnet, and at the western fringe of the study area, and land clearing con-

Figure 1. *Southeastern Manitoba, showing the study area in relation to those investigated by Masters.*[7 8 9 10] *Numbers represent localities mentioned in the text: 1 Beausejour; 2 Darwin; 3 Elma; 4 Ladywood; 5 McArthur Falls; 6 Milner Ridge; 7 Old Pinawa; 8 Rennie; 9 Seddon's Corner; 10 Seven Sisters Falls; 11 Whitemouth; 12 Whiteshell Nuclear Research Establishment (WNRE).*

tinues today. Much of the existing upland forest is second growth, having been burned or felled within this century.

There is thus a rich variety of habitats within a small geographic area. Many butterflies are edge-loving species, so the greatest variety can usually be found along roadsides and woodland trails and in meadows adjoining the forest.

The Butterfly Year

The first warm, sunny days of spring, usually around the end of March, prompt the emergence of overwintering tortoise shells and Mourning Cloaks in the woods, followed a little later by commas. By late April, Spring Azures are sometimes on the wing.

May is the month to find some of the localized, single-brooded coniferous

forest specialties — elfins and Creamy Marblewings then fly among the Jack Pines and Red Disked Alpines and Frigga Fritillaries in some bogs. It is also the time for some more widespread species, such as Dreamy Dusky Wing, Tiger Swallowtail and Common Sulphur, to appear.

June is the peak month for the most common blues, Silvery and Greenish. Ringlets flutter up from grassy meadows, while a variety of skippers haunt both meadows and woodland trails. White Admirals are widespread, and most numerous towards the end of the month.

Butterfly diversity is greatest around the beginning of July, when twenty or more species can be found on a good day. July is the best month to see greater fritillaries and several of the lessers, and also hairstreaks other than elfins. It is time, too, for the midsummer flight of multiple-brooded species such as tortoise shells, Mourning Cloak, Common Sulphur and both Veined and Cabbage whites. Common Wood Nymphs abound in the fields where Ringlets previously flew, with a few Eyed Browns in wetter spots and Northern Pearly Eyes in the forest.

The coppers are a late-flying group, rarely seen before late July, with some species flying well into September. Late summer seems best for Checkered Whites as well. Diversity falls off rapidly during August, however, and only a few species are still in the air by the fall equinox. Fall, like early spring, belongs mainly to the tortoise shells, along with Common Sulphurs and occasional stragglers of a few other species. Activity continues until the last mild days. Sunshine and a temperature above about 8° C will usually tempt out at least a few Milbert's Tortoise Shells. The final flight of the year normally occurs in late October, occasionally early November, and often just a few days before the arrival of lasting snow cover.

Definition of Terms

Estimated abundances are based on the following criteria:

Abundant: More than 50 individuals have been recorded in one day.

Common: Maximum counts of 11 to 50 individuals have been recorded in one day.

Fairly common: More than 10 individuals seen in a season, but no more than 10 seen in a day.

Uncommon: 3 to 10 individuals seen in a season.

Rare: No more than two individuals seen in a season.

The abundance of some species that are inconspicuous or localized, or have short flight periods, may have been underestimated. Such species are indicated with a query (?). For more widespread and common species, an indication of year-to-year variation in abundance, e.g., "fairly common to common," is given. Abbreviations are used for Provincial Road (PR) and the Whiteshell Nuclear Research Establishment (WNRE), 8 km south of Lac du Bonnet. Much of the abundance data was derived from lunch-hour walks at the latter location.

ANNOTATED LIST

HESPERIIDAE — Skippers

Silver Spotted Skipper (*Epargyreus clarus*) — Uncommon, near edges of deciduous or mixed woods. Three sightings each in 1981 and 1985. 11 June - 24 June.

Northern Cloudy Wing (*Thorybes pylades*) — Fairly common, mainly near forest trails and clearings; normal peak in first half of June. 29 May - 7 July.

Dreamy Dusky Wing (*Erynnis icelus*) — Fairly common, mainly near trails and clearings in a variety of wooded habitats. The earliest skipper to fly in spring, it is most common in the second half of May. 9 May - 25 June.

Columbine Dusky Wing (*Erynnis lucilius*) — Hypothetical. A Dusky Wing photographed on the edge of a granite outcrop about 10 km east of Lac du Bonnet, 11 August 1979, appeared to be this species, but some other species of the "Persius" group cannot be ruled out (Figure 2).

Common Checkered Skipper (*Pyrgus communis*) — Rare. One sighting near Whitemouth, 1 August 1981.

Arctic Skipper (*Carterocephalus palaemon*) — Sometimes locally common, mainly near trails and clearings in deciduous woods; most numerous in late May and the first half of June. 25 May - 1 July.

Least Skipper (*Ancyloxypha numitor*) — Rare? One was seen in emergent vegetation along the southeastern shore of Natalie Lake, 4 km east of Seven Sisters Falls, 5 August 1979.

European Skipper (*Thymelicus lineola*) — Fairly common to abundant in meadows and along grassy roadsides. This newcomer to Manitoba (see Preston and Westwood[12]) was especially numerous in 1986. On 1 July that year, 73 were counted in a 5-ha meadow of grass and Alfalfa just west of Pinawa. Few were seen prior to 1986, the first in early July 1983. 19 June - 27 July.

Laurentian Skipper (*Hesperia comma laurentina*) — Locally common. Paul Klassen (*pers. comm.*) collected 10 specimens, and saw many more, in a Black Spruce bog off PR 435, west of Milner Ridge, 26 July 1988. Previously, individuals had been seen there on 9 August 1981 and 26 July 1987.

Indian Skipper (*Hesperia sassacus*) — Hypothetical. Two skippers at WNRE, 12 June 1987, appeared to be this species.

Peck's Skipper (*Polites coras*) — Rare. One was closely inspected in Pinawa, 19 June 1987. A dead one found on a Pinawa street, 12 July 1985, may well have fallen from a vehicle, having been killed outside the study area.

Tawny-edged Skipper (*Polites themistocles*) — Fairly common. This appears to be an adaptable species. It has been found in a variety of habitats, from dry meadows to Black Spruce bog. 6 June - 26 July.

Long Dash (*Polites mystic*) — Uncommon, usually seen in or near lush meadows. 10 June - 27 July.

Hobomok Skipper (*Poanes hobomok*) — Fairly common to common near woodland trails and clearings in June, often in the same areas as Arctic Skipper,

Figure 2. *Possible Columbine Dusky Wing near Lac du Bonnet, 11 August 1979. Peter Taylor*

but favouring somewhat higher perches. The dark female form, "Pocahontas," is uncommon. 27 May - 1 July.

Dun Skipper (*Euphyes ruricola*) — Uncommon. Found in a variety of clearings, trails, roadsides and meadows, but not more than three per day. Most frequently seen feeding on Alfalfa, vetches and clovers. 1 July - 12 August.

Pepper and Salt Skipper (*Amblyscirtes hegon*) — Hypothetical. Some small, dark skippers, seen in Pinawa on dates from 31 May to 23 June, resembled this species, but photographs were not definitive.

Roadside Skipper (*Amblyscirtes vialis*) — Uncommon, usually found in dry, open habitats. No more than two recorded per day. 9 May - 27 June.

PAPILIONIDAE — Swallowtails and Parnassians

Black Swallowtail (*Papilio polyxenes*) — Rare; a few singles seen in June and July. An exceedingly late, badly worn individual was sunning on a roof at Ladywood, 26 September 1987. 4 June - 26 September.

Tiger Swallowtail (*Papilio glaucus*) — Common along roads and woodland edges and visiting Lilac in gardens. Most numerous from late May to mid-June. 15 May - 7 July.

PIERIDAE — Whites, Marbles and Sulphurs

Checkered White (*Pontia protodice*) — Uncommon. Recorded at Grand Beach in late May by Masters, but found in this study in late summer, with thirteen records from six years at eight scattered locations.[9] A road-killed individual in Pinawa, 2 September 1978, was identified as this species, rather than *P. occidentalis*, by Paul Klassen. The latter species may occur here. 25 July; 25 August - 15 September.

Veined White (*Pieris napi*) — Fairly common to common in both meadows and woodland; most numerous in July. Earliest record, 28 April 1987; extreme late dates uncertain because of possible confusion with worn Cabbage Whites. Probably flies until about the beginning of September.

Cabbage White (*Pieris rapae*) — Common to abundant, most frequently seen in or near gardens and fields. The flight period is long, with peak numbers around the end of July. A total of 118 was counted in one binocular scan of a weedy Canola field east of Seven Sisters Falls, 25 July 1987. 17 May - 30 September.

Creamy Marblewing (*Euchloe ausonides*) — Locally common in Jack Pine stands on glacial beach ridges in the Seddon's Corner-Milner Ridge area, and less common on rock outcrops in mixed boreal forest. 5 May - 5 June.

Common Sulphur (*Colias philodice*) — Abundant in Alfalfa fields, and penetrating into the forest along roadsides and trails wherever Alfalfa occurs as a weed. The first adults emerge in May, and small numbers can be found throughout the summer. Large flights have been observed both in early summer and early fall, and a few continue to fly into October. More than 500 were counted over a quarter-section of Alfalfa near Whitemouth, 1 July 1988, and hundreds more were seen in the area. About 180 sulphurs, only about 5% of them orange, were seen in one binocular-scan of a 20-ha Alfalfa field east of Seven Sisters Falls, 20 September 1987; 170 were counted four days later. 5 May - 20 October.

Alfalfa Sulphur (*Colias eurytheme*) — Common. Very similar in habits and flight periods to the preceding species. It sometimes outnumbers the Common Sulphur, e.g., in summer 1987, but not in major flights. White sulphurs, probably albinistic females of this species, are seen quite often, and account for about 5-10% of the population. 28 May - 3 November.

Pink Edged Sulphur (*Colias interior*) — Fairly common to common in both rocky and sandy areas where blueberries abound. 14 June - 24 July.

LYCAENIDAE — Gossamer Wings

Harvester (*Feniseca tarquinius*) — Rare. A road-killed specimen was found on Forestry Road 28, just north of the CPR main line, 24 July 1982, and is now in the Manitoba Museum of Man and Nature. Masters referred to a specimen collected 15 June 1954 by Bird in the Whiteshell.[1,7]

Bronze Copper (*Lycaena hyllus*) — Uncommon, in grassy ditches and wet meadows, mainly in July and August. 5 June - 8 September.

Bog Copper (*Lycaena epixanthe*) — Uncommon. Singles were photographed along a cutline in a Black Spruce bog adjoining PR 435 (west of Milner Ridge), 25 July 1982 and 26 July 1987. Three were seen there, 24 July 1988, and Klassen collected a female two days later. This species appears to be less common than indicated by Masters.[6,7]

Dorcas Copper (*Lycaena dorcas*) — Sometimes locally abundant. Found in clearings in spruce bogs east of Seven Sisters and west of Milner Ridge. Klassen (*pers. comm.*) saw over 100 while searching for Bog Coppers in the latter area, 26 July 1988. Found in the Whiteshell by Masters, usually at the edges of bogs in early July.[7] 20 June - 26 July.

Purplish Copper (*Lycaena helloides*) — Uncommon, found at scattered localities, often near open water. Usually seen in late August and September, but a newly emerged female was closely observed at the Beausejour sewage lagoons, 7 June 1987. 7 June; 25 August - 22 September.

Coral Hairstreak (*Harkenclenus titus*) — Rare? Three scattered records, near Seddon's Corner, Darwin and McArthur Falls. Expected more frequently, since Masters found it "not uncommon" along roadsides in the Whiteshell in July.[7] 1 July - 31 July

Acadian Hairstreak (*Satyrium acadica*) — Uncommon along grassy roadsides. Eight, including a mating pair, were seen alongside PR 211 about 11 km west of Pinawa, 8 August 1979. 18 July - 18 August.

Banded Hairstreak (*Satyrium calanus*) — Rare. Only one record, of two individuals (both photographed, Figure 3), visiting sweet clover blooms at the eastern extremity of PR 211, 18 July 1986. Not mentioned in any of Masters' articles.

Figure 3. *Banded Hairstreak, Pinawa, 18 July 1986.* *Peter Taylor*

Striped Hairstreak (*Satyrium liparops*) — Uncommon. Six recorded, all in July, three of them visiting sweet clover and one, Alfalfa. 1 July - 26 July.

Brown Elfin (*Callophrys augustus*) — Uncommon? Recorded near Seddon's Corner, Milner Ridge, and Old Pinawa, in Jack Pine stands in sandy areas. 18 May - 2 June.

Hoary Elfin (*Callophrys polios*) — Locally common, in Jack Pine stands with Bearberry ground cover in the Seddon's Corner-Milner Ridge area (Figure 4). 18 May - 28 May.

Pine Elfin (*Callophrys niphon*) — Rare? Singles of this well-marked species were found with other elfins among Jack Pines near Seddon's Corner, 18 May 1987, and east of Milner Ridge, 28 May 1988. It was recorded in the Whiteshell by Bird and found in small numbers at Grand Beach by Masters.[1 7 9]

Eastern Tailed Blue (*Everes comyntas*) — Uncommon? Late-flying tailed blues at Pinawa, 7 September (2) and 11 September 1980, were probably this species. One at WNRE, 19 July 1988, was identified on the basis of wing pattern and long "tails."

Western Tailed Blue (*Everes amyntula*) — Uncommon to fairly common. Most tailed blues have been identified as this species, on the basis of very pale underwings with greatly reduced spots and short "tails." 14 May - 1 July.

Spring Azure (*Celastrina argiolus*) — Common. The earliest blue to emerge in the spring, this species is seen most frequently along trails in deciduous or mixed woodland from late April to mid-May. 26 April - 23 June.

Silvery Blue (*Glaucopsyche lygdamus*) — Common to abundant. This species usually emerges about two weeks later than the Spring Azure. It is found both in meadows and along woodland trails. Eighty were counted in a 5-ha meadow near Pinawa, 31 May 1987. Subsequent counts were 56 on 7 June, 69 on 13 June, and only five on 22 June. 14 May - 2 July.

Northern Blue (*Lycaeides idas*) — Uncommon, but fairly widespread, on rock outcrops in mixed-wood forest. Masters commented on the localized distribution of this species and did not find it himself, although he referred to records from the Whiteshell and Grand Beach.[7 9] Highest count five, 15 July 1986. 22 June - 15 July.

Orange Bordered Blue (*Lycaeides melissa*) — Hypothetical. A female blue, with rusty-orange margins on the dorsal surface of all four wings, was observed briefly in a meadow at WNRE, 4 June 1987.

Greenish Blue (*Plebejus saepiolus*) — Sometimes common in meadows, often occurring with Silvery Blues, but peaking slightly later, around mid-June. 15 May - 4 July.

NYMPHALIDAE — Brush-footed Butterflies

Variegated Fritillary (*Euptoieta claudia*) — Uncommon, found both in open meadows and woodland clearings. At least one or two are seen in most years. This species was more common than usual in 1986, with eight records between 30 June and 12 August. A freshly emerged individual was seen at WNRE, 5 September 1984, and a worn one was caught and released at WNRE, 1 October 1979. Recorded in the Whiteshell by both Bird and Masters.[1 7] 12 June - 1 October.

Great Spangled Fritillary (*Speyeria cybele*) — Uncommon to fairly common. Frequently observed in open areas in or near Black Spruce bogs. 19 July - 1 September.

Aphrodite Fritillary (*Speyeria aphrodite*) — Status unclear; it appears to be less common than the very similar Atlantis Fritillary, but too many greater fritillaries pass by unidentified!

Atlantis Fritillary (*Speyeria atlantis*) — Common. As indicated by Masters, this is the most common greater fritillary in the area.[7 9] Most common in July and early August, when it is often seen visiting clover, Alfalfa, Canada Thistles and Spreading Dogbane. 14 June - 1 September.

Bog Fritillary (*Boloria eunomia*) — Uncommon? At least three were seen, and photographs were taken (Figure 5), along a boggy trail through Black Spruce forest west of Seven Sisters, 13 and 14 June 1987. Masters found this species near Rennie, 29 June 1968.

Figure 4. *Hoary Elfin near Milner Ridge, 22 May 1988.* *Peter Taylor*

Figure 5. *Bog Fritillary near Seven Sisters Falls, 14 June 1987.* *Peter Taylor*

Silver Bordered Fritillary (*Boloria selene*) — Sometimes locally abundant. A total of 109 was counted during a 3-km hike through coniferous bog and sedge fen, about 10 km north of Whitemouth, 30 July 1988. Smaller numbers are widespread in moist grassy habitats, often flying with other lesser fritillaries. 26 May - 12 August.

Meadow Fritillary (*Boloria bellona*) — Uncommon, in both moist and dry grassy habitats, along roadsides as well as in fields. An extremely late lesser fritillary seen at WNRE, 21 September 1987, did not settle within view. It appeared to be this species. 18 May - 18 August.

Frigga Fritillary (*Boloria frigga*) — Sometimes locally common. On 23 May 1988, over 30 were found along a 1-km trail through a Swamp Birch-Tamarack-willow bog 3 km southeast of Lac du Bonnet. Paul Klassen obtained a few specimens three days later, when photographs were also obtained (Figure 6). One other possible sighting was in Black Spruce-Tamarack forest about 3 km west of WNRE, 11 June 1982.

Purple Lesser Fritillary (*Boloria titania*) — Fairly common. Most frequently seen visiting Canada Thistles on trails or roadsides adjoining Black Spruce forest. Seems easier to approach than the other lesser fritillaries. 26 July - 12 August.

Harris' Checkerspot (*Chlosyne harrisii*) — Uncommon. One was caught and closely examined along a trail in mixedwood forest near Pinawa, 14 June 1980. Eight other sightings were nearly all in bogs and marshes. An individual of the well-marked *hanhami* race was seen in dry forest east of Milner Ridge, 19 June 1988. 13 June - 18 July.

Northern Pearl Crescent (*Phyciodes morpheus*) — Common to abundant. This is the only one of the recently "split" Pearl Crescents definitely identified here, although Pearl Crescent (*P. tharos*) has been reported from the Whiteshell (Klassen, *pers. comm.*). It may be found from late May to early September, but the greatest numbers by far occur in early July. High counts were 182 along trails near Pinawa, 1 July 1985, and 116 at various localities, 1 July 1986. 28 May - 7 September.

Satyr Anglewing (*Polygonia satyrus*) — Uncommon, most frequently found in roadways and clearings not far from woodland, in July and August. Highest count four, 18 July 1986. 28 April - 23 August.

Green Comma (*Polygonia faunus*) — Only one record, a fresh roadkill near Milner Ridge, 28 May 1988. Masters found this the commonest anglewing in the Whiteshell, with a spring flight to mid-June and fresh adults in August and September.[7]

Gray Comma (*Polygonia progne*) — Fairly common. Most frequently observed between July and early September, with overwintering adults emerging in late April and early May. 20 April - 24 September.

Compton Tortoise Shell (*Nymphalis vau-album*) — Uncommon to fairly common. This is the least common species of this genus, and appears to be less common than Masters found it at Grand Beach and in the Whiteshell in 1966-71. I have seen no more than three in a day. One at WNRE, 20 March 1987, was the earliest flying butterfly recorded in the area. Another was seen at McArthur Falls dam the following day. There is a small flight in July and early August, but the species is seen most frequently in September, often fluttering around buildings in search of somewhere to hibernate. Two were found dead in a large building at WNRE, 17 October 1988. On 18 November 1988, Klaus Spitz (*pers. comm.*) saw a flying butterfly in a corridor of the same building. Almost certainly, it was a Compton Tortoise Shell, disturbed from hibernation. 20 March - 13 October.

Mourning Cloak (*Nymphalis antiopa*) — Fairly common. This handsome butterfly can be found along woodland trails, and sometimes in open fields, at any time from the first warm days of spring to the last ones of fall. The main spring flight occurs in the second half of April and the first half of May. The peak of the summer flight is in July. 29 March - 26 October.

Milbert's Tortoise Shell (*Nymphalis milberti*) — Fairly common to common. Somewhat more numerous than the Mourning Cloak, its pattern of occurrence is similar. It usually edges out that species as the first to emerge in spring. The main spring flight is in April, tailing off into May. Worn survivors from this flight may still be on the wing when the first brightly coloured summer adults emerge. There is a definite midsummer peak in the second half of June. The main fall flight is from late August through September, with stragglers into October and even November. 29 March - 3 November.

American Painted Lady (*Vanessa virginiensis*) — Uncommon in fields and along rights-of-way in forested areas. Unlike the following species, this butterfly is seen in most years, but only in small numbers. 11 May - 5 September.

Painted Lady (*Vanessa cardui*) — Erratic, sometimes abundant. Although rare or absent in most years, this migrant sometimes appears in great numbers. The last major flight in this area was in 1979. Unfortunately, detailed records were not kept, but sightings occurred from late June until 1 October. The only more recent definite records were singles on 27 July 1986, 30 July 1988, and 14 September 1988.

Red Admiral (*Vanessa atalanta*) — Uncommon to common in a variety of habitats; Masters found it scarce, although widespread, in 1966-71.[7,9] The flight period is long, with an ill-defined peak in mid-summer. Fresh individuals are sometimes seen in September. This migratory species was especially common in 1987, and scarce in 1988. 7 May - 29 September.

White Admiral (*Limenitis arthemis*) — Fairly common to abundant. This species is most numerous from mid-June to early July, with a much scarcer second flight in August. 30 May - 3 September.

Viceroy (*Limenitis archippus*) — Uncommon, usually found in wet grassy areas with willows. No more than two have been seen per day. Of two seen

Figure 6. *Frigga Fritillary near Lac du Bonnet, 26 May 1988.* *Peter Taylor*

together, 24 July 1988, one was freshly emerged, and the other was exceedingly worn. 13 June - 22 August.

SATYRIDAE — Satyrs and Wood Nymphs

Northern Pearly Eye (*Enodia anthedon*) — Fairly common along woodland trails, mainly between late June and mid-July. 14 June - 5 August.

Eyed Brown (*Satyrodes eurydice*) — Fairly common in sedge marshes and boggy clearings, mainly in July. A small patch of sedges in a roadside ditch is often enough to hold this butterfly. 20 June - 16 August.

Little Wood Satyr (*Megisto cymela*) — Fairly common in Trembling Aspen woodland with Beaked Hazelnut understory in June. Most records in and near Pinawa. 1 June - 1 July.

Ringlet (*Coenonympha tullia*) — Common in moderately lush grassy meadows; less frequent along roadsides and woodland trails. The main flight is in June, with stragglers frequently seen well into July. 27 May - 25 July.

Common Wood Nymph (*Cercyonis pegala*) — Abundant in meadows and along roadsides, often at the same sites that Ringlets favour. Numbers usually peak in late July or early August. Masters expected, but did not find this species in the Whiteshell.[7] It presently occurs at least at the western boundary of the park. 6 July - 30 August.

Red Disked Alpine (*Erebia discoidalis*) — Uncommon. About ten were flying in a small burned and cleared area, in the early stages of regeneration, at the edge of a Black Spruce stand west of Milner Ridge, 19 May 1986. Five were flying with Frigga's Fritillaries in a bog 3 km southeast of Lac du Bonnet, 23 May 1988.

Macoun's Arctic (*Oeneis macounii*) — Rare? Seen in sandy Jack Pine stands near Seddon's Corner, 5 and 27 June 1982, and may be fairly common in that area. It was surprising to see individuals in Pinawa gardens, 8 June 1986 and 6 June 1988. Macoun's Arctic flies only in even-numbered years in southeastern Manitoba.[9 11]

DANAIDAE — Milkweed Butterflies

Monarch (*Danaus plexippus*) — Uncommon. A few Monarchs are seen nearly every year, in a variety of fairly open habitats, no more than three per day. 31 May - 29 August.

Discussion

This account includes most of the species listed by Masters for the Whiteshell and Grand Beach/Belair areas.[7 9] The only species included in both those lists but not found in this study are Tawny Crescent (*Phyciodes batesii*) and Silvery Checkerspot [Crescent] (*Chlosyne nycteis*). Both are hard to identify in the field, and may have been overlooked. Masters' Whiteshell list also includes Disa Alpine [Spruce Erebia] (*Erebia disa*) and Jutta [Bog] Arctic (*Oeneis jutta*), the latter flying only in odd-numbered years.[7] Masters also suspected the presence of Freija Fritillary (*Boloria freija*) and Giant Sulphur (*Colias gigantea*) in the Whiteshell area.[7] His Grand Beach / Belair list includes records of Comma (*Polygonia comma*) and Great Copper (*Lycaena xanthoides*); he questioned previous reports of Callippe Fritillary (*Speyeria callippe*) and Orange-bordered Blue.[9]

Six species found in this study were reported by Masters for Whiteshell but not Grand Beach/Belair, and the converse was true for another seven.[7 9] Most of these cases probably reflect low abundance and localized distribution, rather than range boundaries. Two species recorded here, Banded Hairstreak and Frigga Fritillary, were not reported for either Whiteshell or Grand Beach / Belair. The 17 species of skipper listed here compare favourably with Masters' estimate of a dozen in the Whiteshell.[7]

Records compiled by Klassen et al. (ref. 5 and *pers. comm.*) include several additional species found within 50 km of the present study area: Juvenal's Dusky Wing (*Erynnis juvenalis*), Sleepy Dusky Wing (*Erynnis brizo*), Grizzled Skipper (*Pyrgus centaureae*), Garita Skipper (*Oarisma garita*), Leonardus Skipper (*Hesperia leonardus*), Baltimore (*Euphydryas phaeton*), and Common Alpine (*Erebia epipsodea*), as well as Pearl Crescent (as noted above) and Giant Sulphur. Clearly, these species should be sought here.

Additional skipper and butterfly species will no doubt be found in this area. Most are likely to be prairie species at the eastern fringe of their range, localized forest species or stray migrants. Most of the species discussed in this section fall into the first two of these three categories.

Given the great year-to-year fluctuations in numbers of many species, the differing study areas, and the more limited abundance data in previous publications, it is difficult to identify any long-term changes in abundance. The apparent reversal of relative abundance of Mourning Cloak and Compton Tortoise Shell, greater recent numbers of Red Admiral in some years, and lower numbers of Coral Hairstreak, Bog Copper and Green Comma, are the most striking apparent differences from Masters' observations.

Acknowledgements

Thanks are due to Paul Klassen, Richard Knapton, Brian McKillop and Bill Preston, for encouragement, helpful comments on earlier drafts and confirmation of the identity of some photographs and specimens.

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[5] KLASSEN, P., A.R. WESTWOOD, W.B. PRESTON and W.B. McKILLOP. 1989. The butterflies of Manitoba. Manitoba Museum of Man and Nature, Winnipeg. 290 pp.

[6] MASTERS, J.H. 1968. Notes on the occurrence of the Bog Copper, *Lycaena epixanthe*, in Manitoba. *Blue Jay* 26:146-148.

[7] _____ The butterflies of Manitoba's provincial parks I: Whiteshell Provincial Park. *Blue Jay* 30:113-118.

[8] _____ A list of butterflies taken at Northwest Angle Provincial Forest, Manitoba. *Blue Jay* 30:118-119.

[9] _____ The butterflies of Manitoba's provincial parks II: Grand Beach Provincial Park and Belair Forest Preserve. *Blue Jay* 30:161-166.

[10] _____ A list of butterflies taken at Sandilands Provincial Forest, Manitoba. *Blue Jay* 30:166-167.

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NOTE:

TO COLLECT OR NOT TO COLLECT, THAT IS THE QUESTION

Most lepidopterists will raise their eyebrows at a butterfly list based largely on sight records. Their concern is appropriate, for as Taylor admits, an unknown number of errors result from sight identification. As butterfly field guides improve, will lists of sight records gradually become more acceptable?

One thinks back to the time when bird lists not based solidly on specimen records were looked at askance. The report of the ornithological branch of the Ottawa Field-Naturalists' Club for 1889 was published in the *Ottawa Naturalist* 4:69-70, in July 1890. A Mr. Lees had propounded a revolutionary method of "observation with an opera glass" and Professor John Macoun had "questioned the accuracy of the results obtained ... and asked for a detailed explanation of the system." At that time, ornithologists often went overboard in their enthusiasm for collecting.

Now there is a growing revulsion against killing any bird, to the point where sound scientific research plans by museums may be cancelled simply because of perceived adverse public opinion. Has the pendulum perhaps gone too far the other way in ornithology? And who knows how far it will go with regard to butterflies? — C. Stuart Houston

NORTHERN REDBELLY SNAKE AT GERALD, SASKATCHEWAN

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In September my attention was drawn to a "large dead earthworm" by my neighbour's children, who were playing in our driveway.

From the limited references I have on herpetology I was able to identify it as a Redbelly Snake *Storeria occipitomaculata* (Storer). An uncommon species, it is the smallest ground snake in the province, attaining a length of about 10 in. It is a secretive animal, hiding under rubbish and leaves, feeding on earthworms and small insects.

The coloration may be brown or very dark brown with a lighter mid-dorsal stripe down the back and two darker lines along its border on each side. There are three prominent light yellowish triangular spots on the neck. (I am unable to see them in my specimen). The belly is some shade of red; the chin is white.

The range of the Northern Redbelly Snake is reported to be from eastern U.S.A. to southern Canada west to the 100th meridian. In Saskatchewan it is found in the Qu'Appelle River valley. Gerald is within the known range.

This is the second time I have seen the species in this area. Many years ago I came across a live one. Today's specimen ended in my collection.

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SIGHTING OF LEWIS' WOODPECKER NEAR LEBRET, SASKATCHEWAN

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On 17 June 1972, in bright sunshine at about 5 p.m., Manley Callin and I were approaching the (then) Skinner Farm in the Qu'Appelle River valley, east of Lebret. We had stopped at a road cutting about 0.5 mi. west of the farm to examine a colony of Bank Swallows, hoping to find Northern Rough-winged Swallows. Suddenly I saw a dark, flicker-sized woodpecker flying fairly low with unhurried flaps from east to west along the edge of the trees about 100 feet away; it then swung southwesterly across a field before disappearing into the poplar woods.

As soon as I saw it, I knew at once it was a Lewis' Woodpecker as I had seen many of them in British Columbia a few years previously. Once seen, its characteristic flight and appearance in flight is never forgotten. Although when viewed at close range the dark red face and belly, gray collar and breast and dark green back can be readily seen, in flight it appears to be all black. It could be confused with a small crow except for its slightly undulating flight, which is much less so than that of other woodpeckers. It could not have been a Northern Flicker as no white appeared at all and no golden wing linings were seen. Actually, about a minute later a flicker did come by on the same course. There was no doubt about its identity, nor have I any doubt about the identity of the Lewis' Woodpecker. There are three previous records for the Regina area.[1]

When the bird appeared I was a few feet ahead of Manley. I shouted "Look, a Lewis' Woodpecker!" and kept my eyes on it until it was gone. When I turned around, I found that Manley had looked in the wrong direction so did not see it. I crossed the field to search but could not find the bird.

Epilogue

It was the late Manley Callin's unfailing task after arriving home to write up accounts and list the birds seen during our trips, so I expected he would have noted my sighting of the Lewis' Woodpecker. When I returned to Regina I wrote an account for my own records. Years later,

in 1978 and 1979, when I often went to Fort Qu'Appelle to help him checking his MS of *Birds of the Qu'Appelle (1857-1979)* (SNHS Special Publication No.13), I inquired about the absence of the sighting in his account of the occurrences of Lewis' Woodpecker. He did not remember the incident nor, when he searched his records, could he find a reference. At home I looked for the account I recalled writing but to no avail — it had disappeared. *Birds of the Qu'Appelle (1857-1979)* was published without it.

Recently I discovered the account I had written on 17 June 1972. The details appear above. I offer this as an amendment to HOUSTON, C. STUART and MARY I. HOUSTON. Additions to Callin's Birds of the Qu'Appelle. *Blue Jay* 44:70-84.

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TWO RUFFED GROUSE ENCOUNTERS

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Another "Crazy-flight"

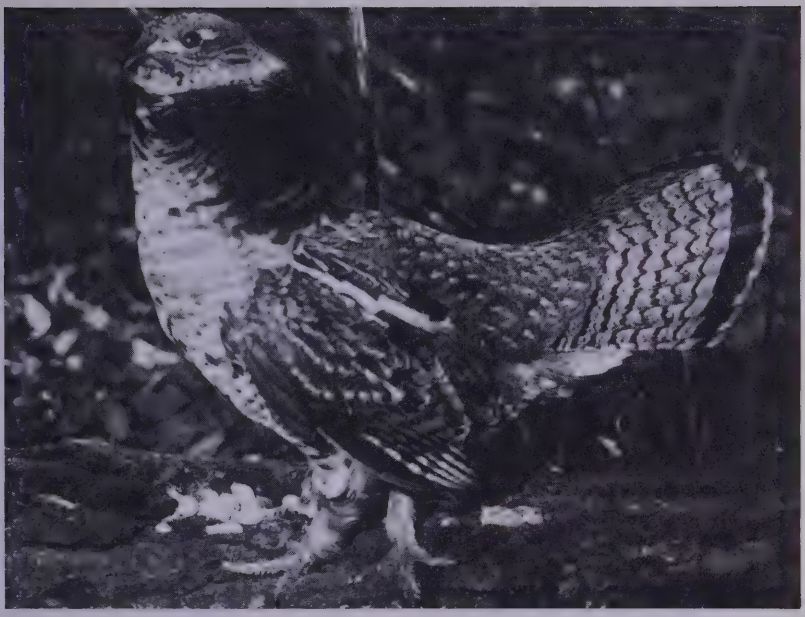
In the morning on 4 September 1988, Ken Giesbrecht noticed from his cottage window at Big Shell Lake a stray cat stalking a covey of 10 Ruffed Grouse. Some birds were on the ground, others were in trees, all watching the cat. Then in ones, twos and threes, the grouse flushed, rocketing through the poplars toward the adjacent lot where, except for three birds, they veered around and over a shed. The three, however, in quick succession crashed fatally into a window on the shed.

Ken concluded the birds were immatures. Upon dressing the carcasses, he found the skin over the keel split readily, whereas he finds it tough on older grouse. He remarked that both shanks of the wishbone (furcula) on each bird were broken.

The small 91 x 45 cm (36 x 18 in.) window struck by the birds was the middle one of a set of three placed high in the wall under a protruding roof. With no windows in the opposite wall of the unlit shed, a bird should not have been miscued by a view through the building; there might have been, however, a reflected image of the trees behind them.

Ken believed the two followers may have been acting as did two pilots in the recent tragedy of a three-member aerobatics team. There the leader misjudged, flew into the ground, and the other two followed him. Opinion was that the following pilots had concentrated on keeping station to the exclusion of all else.

The phenomenon of Ruffed Grouse occasionally flying wildly about and often hitting objects, including windows, has been termed "crazy-flight."[2] Implying knowledge of the trait was the old-timer who years ago cautioned me to board up our cottage windows in the fall, "to stop the stupid grouse from breaking the glass." In articles in *Blue Jay*, Victor Friesen reviewed the literature on the subject and noted that 16 theories had been advanced to explain crazy-flights.[2 3] Regardless of cause, and recognizing that others of the covey had already dodged the shed, crazy-flight behaviour would seem to fit the actions of the lead bird in the Shell Lake instance.



Ruffed Grouse *R.E. Gehlert*

The following birds' actions, or lack of them, are puzzling. Were they driven by a follow-the-leader urge or by a crazy-flight mechanism? That all three Shell lake birds appeared to have suffered the same terminal damage suggests that neither following bird was slowing down or veering at impact.

Of 11 crashes in the Rosthern district recounted by Friesen and nine in Manitoba remarked on by Dennis Fast, a total of 20 incidents, only once was more than one bird stated to be involved.[1 2 3 4] In that case the lead grouse of a covey veered off, but one of the following birds did not, crashing into a house.

Interesting as a casual discussion may be, the salient feature of Giesbrecht's observation was the number of crashes involved, three, resulting in a 30 per cent loss in the covey due to one event.

Unusual Location for Ruffed Grouse

While on a Loggerhead Shrike survey in the Dinsmore district on 7 July 1987, Jim Slimmon and I saw a Swainson's Hawk diving repeatedly on a grouse-sized bird. We were surprised to see through our binoculars a Ruffed Grouse attempting to fend the hawk away from two chicks. Jim ran out into the field and at least temporarily scared off the hawk.

The field was 12.8 km south and 9.6 km east of Forgan in an area devoid of aspen bluffs. The only trees in sight were planted farmyard shelterbelts, although there seemed to be more of these in the Dinsmore district than elsewhere on the plains in this west-central part of the province. Salt, in Birds of Alberta, notes that, although not found on the open prairie, the species occurs along wooded valleys that cut through the prairies.[5] The nearest wooded coulee

was about 16 km to the south in the Missouri Coteau; the closest wooded valley was the Anerley Lakes chain 29 km to the northeast. The presence of a Ruffed Grouse in this locale was remarkable.

Contributing to the oddity of the occurrence was the site itself: the grouse was 50 m into clean summerfallow about 200 m east of a shelterbelt and 25 m west of a small, shallow creek bed. The dry creek bed had tall grasses, weeds, scattered buckbrush and small willow bushes, but no trees.

We surmised that the grouse was caught moving her brood between shelterbelt and creek. But why she was there, why she was making the move and why she did not travel through the roadside grasses were unknowns. The observation was unusual.

I am grateful to Ken Giesbrecht and Jim Slimmon for comments on their respective interests in this article.

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BRIEF OBSERVATIONS OF PEREGRINE AND PRAIRIE FALCON BEHAVIOUR

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Thinking of large falcons almost invariably conjures up images of power and agility. The popular literature abounds with tales of Peregrine or Prairie falcons seen pursuing prey, if not with the speed of light, then at least faster than a speeding bullet. Sometimes, however, falcons find themselves in more pedestrian situations, as described here.

Peregrine Falcons are the only large falcons regularly observed in Winnipeg. They are most often seen migrating through the city in early May and again in late September. On 25 September 1986, a rainy and windy day, one Peregrine, likely a male, had made a few low, sweeping passes over Fraser's Grove Park in Winnipeg. As it came over once more, in a wide circle on outspread wings, a large moth was carried in its direction by the strong south wind. Their paths closed. The Peregrine tilted slightly to alter its course and, while on its side, attempted to grasp the insect in its talons. The moth was momentarily lost from sight, but then it reappeared, fluttering along again in the wind. The falcon did not try again; it merely continued its barely interrupted circling flight.

I watched the incident through 7x42 Leitz Trinovid binoculars at a distance of 30-40 m. Although I am not familiar enough with moths to identify them to species at that distance (who is?), the insect was perhaps 2.5 cm long, with a wingspan of 4 to 5 cm, and it appeared brownish.

On 6 November 1988, after a productive day of birding, Gordon Grieef, George Holland, Russell Tkachuk and I were on our way home in the late afternoon. While driving along Provincial Road 304 east of the hamlet of Stead, Manitoba, we spotted a large flock of small birds approaching us. The birds turned out to be Snow Buntings, about 500 of them. Imagine our surprise on seeing a Prairie Falcon at the head of the flock, then a second Prairie Falcon near the first. The mob passed overhead, the falcons silently, the buntings constantly calling. A similar-sized flock of buntings arose from a plowed field, wheeled around once and joined the chase — 1000 chattering little birds, appearing to drive the falcons away, but in reality trying hard to keep up with their leisurely cruising adversaries, gradually disappearing to the east.

Mobbing of avian predators is not uncommon among passerines and it appears that Snow Buntings do so regularly. Peter Taylor saw about 500 Snow Buntings fly up to chase a passing male Merlin near Seven Sisters in October 1982.[4] Perhaps this may be explained by the fact that Gyrfalcons and Peregrine Falcons often prey on Snow Buntings. Parmelee (in Bent) wrote: "Bunting remains are often numerous at gyrfalcon and peregrine falcon aeries. The gyrfalcons commonly follow the bunting hordes along the coasts in fall; one that MacDonald and I shot had just eaten four buntings."[3]

The best place in southeastern Manitoba to see a Prairie Falcon is Oak Hammock Marsh. From August to October one can usually find anywhere from one to four of these magnificent birds creating panic among the ducks and shorebirds. While birding there on 3 September 1979, David and Madelyn Hall and I witnessed an encounter that had none of the usual dash. A Prairie Falcon was perched on a clump of earth on the bank of a drainage ditch at the north end of the marsh. Nearby swam a Lesser Yellowlegs, probably driven into the water while trying to escape the falcon. The Prairie Falcon repeatedly tried to pick the shorebird off the surface. It would flap quite slowly, almost hovering, from one side of the ditch to the other, each time passing low over its intended prey, which at the last moment would avoid the raptor by diving under water. Each time the falcon would land on the same clump or one on the other side and sit for a moment. It made at least 20 passes, but it did not seem to get any closer to succeeding. Hoping to get a better look, we slowly drove our car to the side of the ditch. The birds were temporarily lost from sight as we rounded an observation mound. When the other side of the mound was reached, a matter of a few seconds, the falcon was tearing at its prey. It was hard to believe, but a close look revealed that the prey was indeed the hapless yellowlegs. Persistence, not great speed, had paid off.

A number of accounts of shorebirds evading falcons by diving into the water have previously appeared in *Blue Jay*. Lahrman witnessed a Prairie Falcon swooping at a Lesser Yellowlegs at Wascana Waterfowl Park in Regina in September 1957. The standing yellowlegs escaped by diving beneath the surface and the falcon flew away.[1] Wallace reported a similar incident when a young Peregrine Falcon drove a Semipalmated Sandpiper out of the air into the water and made three unsuccessful passes at it. The sandpiper submerged each time and returned to the beach after the falcon gave up.[5] Nero saw a flock of Long-billed Dowitchers escape a Peregrine Falcon near Regina by hitting or diving into the water of a small pond. One dowitcher flew off by itself and the falcon flew after it. "Just as the Peregrine closed in on it the dowitcher dived into the water and the hawk overshot its position."[2]

Diving below the surface of the water is clearly a method of escaping large falcons which is often successful for shorebirds.

Acknowledgements

Robert Nero and Peter Taylor were most helpful by commenting on a draft of the manuscript and by bringing a number of sightings to my attention. I thank them both.

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[5] WALLACE, R. 1958. Attempted predation by Peregrine Falcon observed at Toronto Island. *Blue Jay* 16:114.

GREENWATER LAKE BIRDS — A PERSONAL REMINISCENCE OF THE 1940s

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Greenwater Lake is situated in one of Saskatchewan's provincial parks. Now it is a well-developed summer resort with a trailer park, ample sandy beaches and most of the amenities North Americans expect during a summer vacation. When I was a teenager, the park was not nearly so sophisticated.

The lake is located in the east-central portion of the province in a well-treed area that might best be described as deciduous parkland. During the late 1940s, my parents acquired a small cottage after struggling for several years with a shack tent. The cottage was comfortable, but very modest. A small screened porch on the front served as an additional sleeping area.

Our summer vacations can only be described as idyllic. We spent our days fishing, swimming, exploring the woods on foot, and the lake and its creeks by boat. Swimming trunks were our summer uniforms.

In 1944, I was given Taverner's *Birds of Canada*. I later acquired a companion volume entitled *Water Birds of Canada* by the same author. With these books, a passing interest in birds developed into a lifelong hobby. For the first time, I observed that the so-called "Hell-diver" pointed out to me by others had plumage quite different to that of the loon. I discovered the numerous small "ducks" I saw swimming the reedy borders of the lake were not ducks at all, but something called coots. And so it went. The observations recorded below were made in the years 1944 through 1947 and characteristically in each year between approximately 25 June and 30 August. The one exception relates to the sighting of the White-breasted Nuthatch which I saw in the fall of 1947 while visiting Nut Mountain Lake.

The self-taught ornithologist is a sorry student. His mistakes are many, his progress (if any) slow. He may labour for years, learning what the professionally-

taught student learns in three or four well-supervised field trips. The importance of shape, size, flight and posture are concepts learned after long and painful experience.

My observations during these summers were dutifully recorded on a card, but, alas, with little or no supporting detail. The youthful observer who sees an Osprey at regular intervals over a period of 2 months may not feel any need to record location, date, weather and activity. If he sees a Scarlet Tanager but once in his young life, he will probably be more fastidious.

My recollections of Greenwater are a collage of sights and sounds. From these I have tried to reconstruct a factual record of the birdlife of Greenwater Lake Park as seen through the eyes of the young, amateur ornithologist.

The lake itself was the great wellspring of sights and sounds. The first sounds of morning were the pluckings and splashings of the Red-necked Grebes, the last sound at night the spine-chilling call of the Common Loon. The reeds of the lake sheltered Pied-billed Grebes, American Bitterns, Great Blue Herons and the shy Sora. As my brother and I rode quietly through the slippery green cattail, we could see countless grebe eggs, casualties, we concluded, of spring and summer storms. Many coots nested in the areas of the dead brown reeds and shallower water of brackish bays. Occasionally I saw a less common swimmer, my one and only Western Grebe, and an occasional Double-crested Cormorant.

One of the park's chief claims to fame was the large colony of American White Pelicans that lived on its northern shore. Fishermen muttered about the great bird's appetite for fish and, as a fisherman, I had my doubts. The pelicans flourished, however, and so did the fishermen.

I always thought that the lake belonged to the grebes and the waders. There were many ducks. Mallards were so common that I simply noted their presence, as I did the presence of less com-

Common Goldeneye *Fred Lahrman*

mon species, such as the Northern Pintail, Northern Shoveler, Canvasback and the scaups. Blue-winged Teal often crossed our paths, flying at great speed. I remember my one observation of a male Ruddy Duck as it swam nervously in the expanse of the lake.

The most typical duck it seems to me was the Common Goldeneye. We saw adult birds everywhere. They seemed to have large and well-tended families. I thought this to be the commonest duck at the lake.

The other species most identified in my mind with Greenwater was the Turkey Vulture. We often saw the adults circling high above the lake, their characteristic shape silhouetted against the bright summer sky. These birds could be seen roosting on the stumps of fallen trees along the lakeshore and taking in the summer sun. Their appearance did not encourage us to look for the nests that were probably situated at the base of the upturned trees.

We often saw Red-tailed Hawks around the lake. The other sighting which made a great impression on me was of a male Peregrine Falcon pursuing a Mallard at great speed as we sat in our boat fishing between the points of the lake.

The first species I can recall making any real impression on me was the Common Yellowthroat. I was so taken by its spectacular plumage that I can remember doing a water-colour painting soon afterwards. It would be more than 30 years before I ever saw another.

As to the other species that I have noted in the following list, in many instances I observed either a nest or young or both, and I have tried as much as possible to note where that occurred. Perhaps the observations I have recorded will be of some assistance to other observers as the years unfold. The list represents as much as anything a record of an extremely happy and fulfilling time in my young life and one that I look back on with a great deal of pleasure.

All species were observed at some length in good to excellent light. Doubtful observations are not listed. I have not listed an isolated sighting of what was probably a Scarlet Tanager (male).

KEY: (c) common; (u) uncommon: (r) rare; (?) no record of frequency in observer's notes; (n) nest observed; and (y) young

Common Loon (c,n,y), Pied-billed Grebe (u), Red-necked Grebe (c,n,y), Western Grebe (r), American White Pelican (c), Double-crested Cormorant (r), American Bittern (c), Great Blue Heron (u), Mallard (c,y), Northern Pintail (r), Blue-winged Teal (c), Northern Shoveler (r), Canvasback (u), Lesser Scaup (u), Common Goldeneye (c,y), Ruddy Duck (r)

Turkey Vulture (c), Osprey (u), Northern Harrier (c), Broad-winged Hawk (r), Red-tailed Hawk (u), American Kestrel (u), Peregrine Falcon (r), Ruffed Grouse (u), Sora (c), American Coot (c,n,y), Killdeer (c), Greater Yellowlegs (c), Lesser Yellowlegs (c), Solitary Sandpiper (c), Spotted Sandpiper (c), Least Sandpiper (u), Common Snipe (r)

Franklin's Gull (u), Ring-billed Gull (c), California Gull (c), Herring Gull (c,y), Common Tern (c,y), Black Tern (c), Mourning Dove (u), Black-billed Cuckoo (r), Great Horned Owl (c), Common Nighthawk (u), Ruby-throated Hummingbird (r), Belted Kingfisher (u), Yellow-bellied Sapsucker (c), Downy Woodpecker (c), Hairy Woodpecker (c), Northern Flicker (c), Pileated Woodpecker (r)

Western Wood-Pewee (c), Least Flycatcher (c), Eastern Phoebe (c), Great Crested Flycatcher (r), Eastern Kingbird (c), Purple Martin (r), Tree Swallow (c), Bank Swallow (c), Barn Swallow (c,n,y), Blue Jay (c), Black-billed Magpie (c), American Crow (c), Common Raven (c), Black-capped Chickadee (c), White-breasted Nuthatch (?), House Wren (c), Mountain Bluebird (c), Veery (?), Hermit Thrush (c), American Robin (c), Gray Catbird (u), Brown Thrasher (c), Cedar Waxwing (c), Loggerhead Shrike (c)

Solitary Vireo (u), Philadelphia Vireo (u), Red-eyed Vireo (c), Yellow Warbler (c), Yellow-rumped Warbler (c), Black-and-white Warbler (c), American Redstart (c), Ovenbird (u), Northern Waterthrush (r), Common Yellowthroat (r), Rose-breasted Grosbeak (r), Rufous-sided Towhee (r), American Tree Sparrow (r)*, Chipping Sparrow (c), Clay-colored Sparrow (u), Vesper Sparrow (c), Fox Sparrow (u), Song Sparrow (c), White-throated Sparrow (c), Dark-eyed Junco (c)

Red-winged Blackbird (c), Western Meadowlark (u), Yellow-headed Blackbird (r), Rusty Blackbird (c), Brewer's Blackbird (u), Common Grackle (c), Brown-headed Cowbird (c), Northern Oriole (c), Purple Finch (?), Pine Siskin (?), American Goldfinch (c), House Sparrow (u)

*Upon receiving my report on the sighting of the American Tree Sparrow, which occurred in late June, Maurice G. Street expressed some doubt about it. I felt obliged to mention it, however, because I saw the individual bird for several minutes in excellent light.

American White Pelicans *Anna Miller*

ERRATIC FLIGHT OF A DOWNY WOODPECKER

FRANK H. BRAZIER, 2657 Cameron Street, Regina, Saskatchewan. S4T 2W5

On 19 March 1989 at 10:00 a.m., under a heavily overcast sky, I stepped onto the parking lot in the southwestern angle of the Legislative Building in Regina. I heard the call of a Downy Woodpecker coming from a grove of trees immediately south of the parking lot. I was crossing the lot scanning the grove when a small bird shot out of the group of trees and gave a display of aerobatics I have never seen equalled.

The bird flew at such a rate that it literally disappeared and only the white in the plumage enabled me to follow it at all. It shot upwards, perhaps 30 feet, "jinked" and sped downwards at an acute angle into a shrub; then, without pause, it shot upwards to about the same height, snapped into a reverse and dove at high speed into the shrubbery at the east side of the lot. Then, again without pause, it shot out and into the shrubbery

on the north side of the lot, where I lost sight of it. As I neared the place, it reappeared, zoomed up, "jinked" again and sped over to the grove of trees on the west side. It came to rest on a tree where I could see that it was a female Downy Woodpecker. It then went about its business calmly in the normal way.

I estimated that the parking lot was 90 x 180 ft., the long sides east and west. The entire episode could not have taken more than 90 seconds.

I have never before seen such amazing manoeuvrability by an ordinary bird. It reminded me of the flight of feeding swifts or bats. The speed was unbelievable and the turning angles at the tops of the upward zooms were incredibly sharp.

After the exhibition I then heard another Downy call from the grove to the south and going there saw a male Downy prospecting a tree. Behind it and higher up in another tree close by was a Hairy Woodpecker. The male Downy then flew over to the female's tree, and the Hairy flew into the same grove but further to the west and settled higher in another tree.

I was puzzled by the extraordinary demonstration put on by the female Downy. I remembered that last winter Elmer Fox and I had witnessed a performance by a Downy Woodpecker seemingly against a Hairy. Both birds were on an old dead tree, the Downy very agitated and keeping up a continuous harsh scolding chatter while flying at the larger bird. The Hairy appeared unconcerned and kept on prospecting on the old tree. We thought then that the Downy recognized in the Hairy a threat to its potential food supply and was protesting accordingly. It was reminiscent of the reaction of a Townsend's Solitaire towards a flock of Bohemian Waxwings which were pillaging its winter supply of Siberian crabapples which I have described (BRAZIER, F.H. 1961. Gray Gladiator. *Blue Jay*, 19:119).

The demonstration on 19 March seemed to have no purpose. When I first saw the female Downy she had left the immediate vicinity of the Hairy and gave her breath-taking performance about 100 feet from where the Hairy was found.

I sent copies of my description of the Downy's strange behaviour to Dr. Stuart Houston, Saskatoon, and Dr. Robert W. Nero, Winnipeg. Dr. Houston recommended sending a copy to "...one of the world's leading behaviour experts, probably No.1 for woodpeckers," Dr. Lawrence Kilham, of Lyme, New Hampshire, which I did.

Dr. Nero suggested that what I saw was the end of a stressful situation affecting my Downy. That part of the Legislative Building grounds had been regularly patrolled all winter by Merlins and possibly my Downy "froze" for a period to escape the watchful eye of the falcon. When the predator flew away, the tension was released and I may have seen the result — erratic flight.

Dr. Kilham advised me that he had written about "Erratic Flights" in an earlier book: *Life History Studies of Woodpeckers of Eastern North America* (Publication No. 20, Nuttall Ornithological Club). I quote most of his informative and interesting letter below:

> As described on p. 210 'A second form of play is erratic flight in which woodpeckers suddenly loop in, out, and around trees. This might be regarded as being merely a form of exercise, except that it occurs most frequently at the same time as dodging (i.e., dodging around tree trunks) and may even follow it directly. A Hairy on January 30 dodged before a chickadee, then flew off in erratic flight. This type of flight is a form of dodging on the wing, as if the woodpecker was being pursued by a hawk. I have noted it in the field for Hairies, Downies, as well as for sapsuckers, flickers, Red-cockadeds, Pileateds and Red-bellieds.
>
> Morse (1975, *Ibis*, 117:379-382) gives a closer description . . . in his account of 'erratic flight' of European Goldcrests and Treecreepers. Although most of the flights

he witnessed were without provocation that he could discover, two, one for each species, were when pursued by a Sparrowhawk.

Thus, although frequently performed as play and a way of exercising, erratic flights can be used as a means of escaping pursuit by a predator. I describe erratic flight in a yearling American Crow in my recent book, *THE AMERICAN CROW AND THE COMMON RAVEN* (1989, Texas A&M University Press), p.151.

The erratic flight I witnessed could be that of a highly-strung individual's reaction to a stressful situation as suggested by Dr. Nero; my Downy may have been more exposed to attack than the other two woodpeckers (if a Merlin was present) so they did not perform as she did. Other causes might be those mentioned by Dr. Kilham, i.e., play or exercise.

I am most grateful for the consideration given to my inquiries by by Drs. Houston, Kilham and Nero.

Downy Woodpecker
Juhachi Asai

HOODED MERGANSER IN EAST-CENTRAL SASKATCHEWAN

DONALD F. HOOPER, Box 40, Somme, Saskatchewan. S0E 1N0

The Hooded Merganser has been considered a rare species in east-central Saskatchewan. Maurice Street reported one bird for 1948 and one for 1953 in the Nipawin area.[3] Wayne Harris saw six birds on McBride Lake 18 September 1976 (*pers. comm.*). Ronald Hooper and I have only four sight records with a total of about 11 individuals seen in the Somme area between 1951 and May 1987. That is why we were surprised to find the species fairly common at Greenwater and Marean lakes in Greenwater Provincial Park while we were doing a survey of waterfowl departure dates during the fall migrations of 1987 and 1988.

The greatest number of birds seen in one day was 150 at Greenwater Lake on 28 October 1988. Because we have not made a late fall study on waterfowl of the park before, we do not know if this species is regular there every year. It is likely, however, that Hooded Mergansers find the woodland lakes in the park a very suitable place for a stopover and that they do this consistently in fall migration.

In five areas surveyed, the largest number of sightings occured between 18 October and 1 November:

Greenwater L: 23/9/88 - 3; 10/10/87 - 2; 25/10/88 - 30; 28/10/87 - 5; 28/10/88 - 150; 31/10/88 - 4; 6/11/87 - 6; 8/11/87 - 6; 12/11/87 - 5; 14/11/87 - 9.

Bjork L: 7/10/88 - 2; 18/10/88 - 12

Big Piwei L: 23/10/88 - 15

Marean L: 31/10/88 - 30; 1/11/88 - 10; 4/11/88 - 4; 7/11/88 - 3; 12/11/87 - 1; 14/11/87 - 8; 16/11/87 - 1

Weekes-Red Deer R: 10/10/88 - 2

Our early spring arrival date is 28 April 1984 (Bertwell) and departure is 12 May 1987 (Somme). The earliest fall arrival, three males probably in migration, is 23 September 1988 (Greenwater Lake); the latest fall departure is 16 November 1987 (Marean Lake).

Prior to 1988 there was only one summer record for the area, which was one pair seen on the Red Deer River north of Weekes in late June 1951 (R. Hooper, D. Hooper).[2] With three breeding records added in 1988, one might call this "the year of the Hooded Merganser!"

On 2 June 1988, while watching Blue-winged Teals and Mallards on a beaver pond in the mixed forest 2 mi. south of Somme, I was surprised to see a female Hooded Merganser, very distinct with her crest and narrow bill. She was there again on 27 June; this time she had some newly hatched young swimming with her. It was hard to make out the ducklings among the floating debris and duckweed that covered the surface of the water. As the mother swam deeper into the shadows I counted six little balls of fluff following her and there could have been more. Then I noticed a little movement beside a floating log and I could see that it was the male. He was very inconspicuous as he kept his showy crest flattened.

Further evidence of breeding was obtained on 11 July. While Carl and Joyce Mohr and I were boating near the east shore of Marean Lake we saw a female Hooded Merganser with nine young. They were swimming in the open water about 6 feet from the bulrushes and sedges. Having a good look at the mother bird with binoculars, I again saw the distinctive crest and narrow bill. The ducklings looked about 2-3 weeks old.

A third breeding record was reported by Herman Duerksen, who lives at Greenwater Lake. In the last few years he has become a keen birdwatcher and feeds birds year round. Herman often goes canoeing along the lakeshore with field guide and binoculars. In late June he saw a pair of Hooded Mergansers with five young.

In 1986 W. E. Godfrey listed Brightwater Reservoir, Big Quill Lake and Tobin Lake as breeding localities for Hooded Merganser in Saskatchewan.[1] Although we have added three more breeding records, this species is still a rare summer resident in our area. The number of birds seen in Greenwater Provincial Park in fall migration indicates that most of them nest elsewhere.

[1] GODFREY, W.E. 1986. The birds of Canada. Rev. ed. Nat. Mus. of Canada, Ottawa. 595 pp.

[2] HOOPER, R. and D. HOOPER. 1954. A preliminary list of the birds of the Somme district. Contribution No. 3, Yorkton Nat. Hist. Soc.

[3] HOUSTON, C.S. and M.G. STREET. 1959. The birds of the Saskatchewan River - Carlton to Cumberland. Spec. Pub. No. 2, Sask. Nat. Hist. Soc. 205 pp.

Hooded Merganser *Wayne Lynch*

A FORK-TAILED FLYCATCHER AT DRUMHELLER, ALBERTA

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The "Golden Eagles," senior citizens from the Saskatoon Natural History Society, visited Drumheller, Alberta, on 1 June 1988 and in the evening a few members briefly birded the McMullen Island Picnic Area. There, F. Hartley Fredeen, Thelma V. Pepper and I observed a Fork-tailed Flycatcher (*Tyrannus savana*), a rare vagrant from South America.[17]

As the species was not on documented, confirmed or hypothetical lists for any of the western provinces, the bird was the first recorded in the West.[11 3] It was Canada's sixth record.[7]

The site, by the McMullen Island access road in Midland Provincial Park, was about 400 m from the junction with North Dinosaur Trail. It was beside the Red Deer River about 50 m south of a maintenance shed. Vegetation was shrub willows along the shore, mixed scrub thickets above the bank, and riverine cottonwoods and poplars; across the narrow river were sagebrush flats and arid hillsides.

Hearing unfamiliar calls upon arrival, the group started to track down this first mystery bird (eventually found to be a

Yellow-breasted Chat — rarity enough for birders from the extreme north of the Great Plains). Concurrently, the three of us noticed an exceptionally long-tailed black and white bird in a nearby dead tree top. Yet another ubiquitous magpie was the reaction. However, major differences were obvious — "a longish tail fluttering in the breeze . . . black and white plumage. I thought of a magpie but this bird was all white below and smaller" (Fredeen). We had a second mystery bird.

Hartley viewed the bird from a hillock to the northeast; Thelma and I edged closer to it from the northwest, pausing to observe. At 30 m we studied the bird for about 2 minutes before it flew off. As we had to break away, our attempt to relocate the stranger was brief; early next morning the entire party hunted for it unsuccessfully. The bird atlas surveyor for the Drumheller zone, Ross Dickson, Calgary, scoured the district on 4-5 June, locating the chat, but not the flycatcher.[5]

Observations aggregated about 5 minutes; the time was 8:50 p.m. (on 1 June sunset at Drumheller was 9:41 p.m. local time.)[18] Conditions were ideal: breeze light, sky clear, lighting mainly to front and side, lines of sight unobstructed. Only the upper part of the bird's back could not be seen fully. Because our viewing angle shifted as we approached, our perspective of the bird ranged from quarter-rear to quarter-front.

Head outline and bill shape were a flycatcher's, body size and posture a kingbird's. One's attention was repeatedly drawn to the tail: it was much longer than the usual small bird's and considerably exceeded body length. Although the tail was deeply, yet narrowly forked, no scissoring movement was noticed. Each element of the bifurcation was built up of layered, progressively longer feathers, as on a Scissor-tailed Flycatcher. A jet-black cap similar to an Eastern Kingbird's extended below the eye and into the nape. Wings and tail were a gray-black, with no wing bars or banding. The portion of the back that could be seen appeared darkish. Contrasting sharply with the black cap were throat, side of neck around to the nape, and breast and belly, dazzling white in the lowering sun. The underparts had no bars, streaks or suffusions. No call, alarm or song notes were heard.

Reference to the National Geographic Society field guide indicated a Fork-tailed Flycatcher.[17] Two differences, however, were noted: throat and neck were pure white on the observed bird, not off-white as illustrated, and, as for a female or moulter, tail length was three-quarters of that portrayed. A photograph in the Audubon Society's *Master Guide* better accorded with the observations, particularly in depicting pure white below the cap and showing wing coverts only a shade lighter than primaries and secondaries.[6] The tail was longer than that on the immature sketched in the *Master Guide*. Based on tail length and also on colour tones, the Drumheller bird was deemed to be an adult.

Similar species? An accidental vagrant in Alberta and a species familiar to me from Texas birding, the Scissor-tailed Flycatcher, has other features in common with the fork-tail besides a resemblance in tails.[16] Colours and patterns, however, are profoundly unalike. Besides other affinities, the Eastern Kingbird and fork-tail are akin in size and in the distribution of black and white, yet tails differ basically in structure, length and banding.

The subspecies that is believed to throw off vagrants into North America ranges east of the Andes from northern South America to Argentina.[15] This highly migratory southernmost population nests south to Patagonia, in semi-arid habitats, and winters across the north of that continent, moving into the tropical zone at the end of the breeding season in austral fall (our spring).[4] Rarely, a few birds fly to North America, where most reports are of vagrants wandering in the northern fall into southern and eastern United States. In eastern Canada the fork-tail is classed as an accidental.[7] Thus this flycatcher's presence in Alberta on 1 June strained belief. The

The Golden Eagles at Drumheller, Alberta. *Jim Pepper*

usual hypotheses advanced to explain extralimital occurrences are cage escapees, abnormality causing wandering or lack thereof, weather-influenced movements, mass irruptions or random wandering normal for the species. A study of records and environmental conditions provided some rationale for the Drumheller bird.

The number of these birds reaching the United States and Canada is extremely small. Monroe and Barron listed only 40 records from the early 1800s to 1978.[12] Just four were in Canada: one at Thunder Bay — the only previous Canadian interior record — one in New Brunswick and two in Nova Scotia. Of the U.S. records only two, in Michigan and Wisconsin, were in the interior. Excepting a lone California report, all the rest were from south and east coast regions, with two-thirds of them in the Maryland-Nova Scotia zone. Over the last 40 years, reports per decade remained constant in the Gulf coast region, while increasing in this northern Atlantic coast zone from two in the 1940s to 12 in the 1970s. Unknown is the extent to which this increase either mirrors bird movements or reflects improvement in information gathering.

Fork-tails in North America were believed to be birds which overflew when migrating north from the Patagonian nesting grounds to the wintering range. Monroe and Baron noted that 33 of the 40 observations were late summer through fall, which is the austral spring. Movement then should have been southward, not to the north. They concluded that an unheard of austral spring migration continuing in the same direction as the austral fall movement was occurring.

The records for 1979 to 1987 indicated that established trends in numbers, loca-

tions and distribution continued into the 1980s. The incidence of reports increased again, to 16, including a sighting in Quebec in 1982.[8] Once more, most of them were in the northern Atlantic coastal zone in autumn. Only four were spring-summer and just one record, in Michigan, was from the interior.[14] Four birds were adults, one an immature. Against this historical background, circumstances and records in 1988 were then considered.

American Birds regional reports for spring 1988 for the territory of interest were examined.[1] The ten regions encompassing possible routes between South America and Alberta extended from the eastern Gulf coast and the Sonoran deserts north to the Prairie Provinces, and from the intermountain plateaus east into the Midwest. Four themes appeared in the reports: strong, sustained, warm southerly winds over most of the interior; continuance of extreme drought across almost the entire vast area; earlier-than-normal migrations and unusual numbers of southern rarities in most regions (for example, a tropical Great-tailed Grackle in South Dakota).[2] Several editors attributed the two avian phenomena to the winds.

Weather maps for the last 10 days of May displayed a fluid pattern of continuous strong southerlies, with origin at one time over the Caribbean, at another over the Mexican deserts; although shifting between Midwest and intermountain Great Basin, the dominant flow was through the central plains. Except for brief local interruptions by westerlies in the American Southwest and northwesterlies in Alberta, wind direction varied from southeasterly (for example, across the Midwest to Montana) to southwesterly. Strong winds occurred at night as well as during the day and at low elevations as well as high.[10]

Five reports of Fork-tailed Flycatchers in North America in 1988 equalled the previous high.[19] Following historical disposition, three were in coastal regions and two were in the interior: Alabama, Virginia, Quebec (September 1988), Wisconsin and Alberta.[9 19 13 20] Three sites were practically the same distance north, in a narrow band approximating 50° north latitude: the Wisconsin bird at 47°, Drumheller's at 52° and Quebec's on Anticosti Island at 49°.[13] From the wintering grounds in South America[12], which are 0° to 10° north latitude, these birds appear to have wandered half the distance from equator to pole. More germane, four of the five observations were in spring and summer; only the Quebec sighting was in autumn.[13] This occurrence, a reversal of historical timing, suggests that these four birds overshot the austral autumn migration target.

In sum, several conditions were conducive to a Fork-tailed Flycatcher being in Alberta in spring 1988: some species abnormality caused flights northward — and southward — far beyond the nominal range, southerly winds evidently drafted many rarities into the continent's interior, with warm, arid conditions possibly contributing to these movements and the wind pattern's southeasterly component may have displaced the forktail westward — without which shift it could have been another Thunder Bay or Wisconsin sighting. Although most fork-tails are reported from the Atlantic coast region, five records are in a band at 50° north latitude, and thus the extent of the Drumheller bird's northward flight was not unique. Observations north of the Gulf coast region have increased in each recent decade, with 1988 being a high year, but, unusually, most of the finds were in spring. These several factors, however, could create only one-half the observation; fortuitous or planned, the other half resulted from more birding, our presence in Drumheller so demonstrating.

There were two purposes for the Drumheller trip. One was to tour the new Tyrrell Museum of Palaeontology, a first-rate museum well worth a visit, and the other was to bird the Red Deer valley and adjunct coulees, a great place for birds.

Acknowledgements

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TURKEYS AT CLAIR, SASKATCHEWAN

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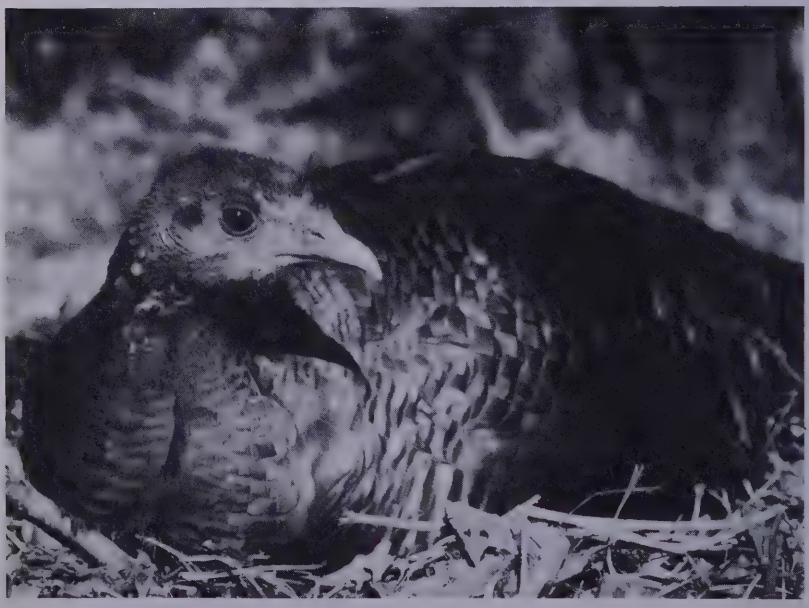
At approximately 11:00 a.m. 29 December 1988, an unusual sighting was made from Highway 5 just east of Clair, Saskatchewan. Very close to the north side of the road, in a small grove of poplars, three large, dark objects appeared in the trees. As my vehicle approached the trees, my first impression was that these objects were raccoons; my next impression was porcupines; my third impression was black plastic garbage bags! As the car passed the small bluff, the objects moved, revealing that they were birds — large, dark birds.

I turned the car and drove back, parking on the shoulder of the highway, 20-25 m from the poplars. The birds were roosting 3-4 m from the ground. Visibility was about 1 km with very light powdery snow. My wife and I and our two children had the opportunity to observe the birds under favourable conditions using 7x35 binoculars and a copy of *Birds of North America*.[8]

The only large bird which could possibly meet the descriptions of these three was a Wild Turkey. This was reinforced by comparing field marks with the field guide.

The nearest of the three birds had a definite lightening of colour around the head which made me think of a Turkey Vulture. However, there was no distinct line between black body and red, naked head as in that case. This bird had an indistinct margin between body and a whitish upper neck and head, with some red overtones, particularly along the front. I am familiar with Turkey Vultures and am convinced that this was not what was perching in the trees. Godfrey differentiates Wild Turkeys from domesticated fowl by the former having tails tipped with brown and the latter tipped with whitish or pale buff.[2] This bird had some rusty-coloured upper tail coverts, though I did not notice this reddish coloration continuing down the complete tail, and the tip appeared black. The birds were observed for 5 to 10 minutes until a passing truck caused them to drop into the grasses and bushes below their roost, where they soon moved out of sight.

Although I am not familiar with these birds other than observing them at Polar Park, Ardrossan, Alberta, Wild Turkeys have been sighted previously in Saskatchewan. They were first reported in the 1980 Christmas Bird Count at Biggar and regularly thereafter with the exception of 1984 and 1985. Most of these sightings have been in the Cypress Hills.[1 3 4 5 6 7]



Wild Turkey *Wayne Lynch*

Clair, Saskatchewan, is a long way from the turkey's natural range. I am curious to know whether other sightings of these birds have been made in this area. Speculation leads me to wonder if these Wild Turkeys were released or had escaped from a neighbouring farm.

[1] BELCHER, MARGARET. 1982. 40th annual Saskatchewan Christmas Bird Count—1981. *Blue Jay* 40:17-29.

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MELANISM AND HAIRLESSNESS IN THE RICHARDSON'S GROUND SQUIRREL

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Aberrant pelages in the rodent family Scuiridae are not unusual. In some species, such as Woodchuck, melanism and albinism occur on a regular basis. In other species such as the Gray Squirrel, the melanistic morph occurs in some populations to the exclusion of the normal morph. Other species exhibit little or no pelage aberrations. The Richardson's Ground Squirrel is one such species. I have been able to find one reference to albinism[1] and none to melanism in this species. Recently, the Provincial Museum of Alberta received two specimens of Richardson's Ground Squirrel that are worth reporting because of their aberrant pelage.

The first specimen, a melanistic form (PMA No. 88.16.1), was obtained in the Didsbury area of central Alberta in June 1988. The individual is well furred with hair of normal length but entirely black in colour. The specimen was collected in a roadside ditch beside a field that was used to pasture livestock. A number of other black ground squirrels (25 to 30) along with a large number of normal-coloured individuals was observed in this pasture. An interview with a person who lived nearby revealed that the landowner allowed the shooting of "gophers" on this land, but only if they were of normal colour. The black individuals were not to be shot. The following standard

museum measurements were obtained from the specimen label: adult, male, weight 417.7 g, total length 330 mm, tail 83 mm, hindfoot 50 mm, ear from notch 13 mm.

The second specimen (PMA No. 85.18.1) was collected near Spruce Grove Alberta, in July 1985. The specimen has a black skin and is almost entirely hairless. There is a scant covering of extremely short hair on the head and the posterior portion of the back. Vibrissae [whiskers] are present but they are very short and few in number. The central back, sides, belly, and front and hind legs lack any hair covering. There is dark gray hair on the front and hind feet but it is very short and thin. The skin is dark brown or black on the back and cream-coloured on the chest and underside of the legs. The belly is darker than the chest. The tail is round, tapered and hairless. The museum specimen label reads: sub-adult, female, weight 224.4 g, total length 277 mm, tail length 70 mm, hind foot 45 mm, ear from notch 11 mm.

DuBowy and DuBowy reported an instance of hairlessness in a Golden-mantled Ground Squirrel and stated that they were not aware of hairlessness in other ground squirrels.[2] They believed the squirrel they saw was fully grown but could not determine whether it had overwintered. They observed the ground squirrel in August. Hairlessness has also been reported in the House Mouse.[3] In this case two individuals were reported from separate locations. As well as being hairless, the mice exhibited an excessive growth and folding of skin. The specimens were called "rhinoceros mice" because of the skin condition. The ground squirrels reported by DuBowy and DuBowy and the Spruce Grove specimen do not show any excessive skin growth.[2]

Specimens housed in the Provincial Museum of Alberta yielded the following data for 20 adult female Richardson's Ground Squirrels: weight (g): mean 332.5, range 273.2-375.0; total length (mm): mean 292.8, range 284-306. Comparing the weight and total length of the Spruce Grove specimen to these mean measurements shows that the Spruce Grove specimen has achieved 67% of the mean adult weight and 95% of the total length of Alberta female Richardson's Ground Squirrels. This would suggest that the Spruce Grove specimen is a young of the year and has not overwintered. The chances of such an individual successfully overwintering seem rather slim, as even "normal" young of the year have a high overwinter mortality.[4] It would appear then that this animal would not be in the breeding population and that the genetic basis of hairlessness, if in fact the condition is the result of a mutation, would not become established in the population.

The situation with the melanistic form is entirely different. Once the landowner observed black individuals on his property he enhanced their chances of survival by not actively killing them, while he had no concern about eliminating the normal-coloured morphs. No one to whom we spoke was able to tell us how long the melanistic forms had been around. We surmised, from the number of individuals counted and the fact that the individual collected was an adult, that it must have been for some considerable time. If this is so, and if an active program is in place to enhance the survival of black individuals, the genetic pool for the black morph will be greatly enhanced and more melanistic individuals can be expected to occur in the area.

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[2] DUBOWY, P.J. and V.S DUBOWY. 1988. Hairlessness in a Golden-mantled Ground Squirrel. *Prairie Nat.* 20:231-232.

[3] GOEHRING, H.H. 1971. Two Rhino Mice (*Mus musculus*) from Minnesota. *J. Mammalogy* 52:834-835.

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THE STATUS OF THE BLACK-FOOTED FERRET IN CANADA

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Black-footed Ferrets (*Mustela nigripes*) once ranged throughout southern Saskatchewan but reportedly have disappeared from the Canadian prairie landscape. Recent sightings and previously unreported specimens of Black-footed Ferrets suggest that the species still may exist on large tracts of native grasslands. The purpose of this paper is to evaluate recent sightings of Black-footed Ferrets and to assess the possibility of the continuing existence of this species in Canada.

At present, the Black-footed Ferret is one of the most endangered species in North America and is listed as endangered in the United States.[3] Historically, Black-footed Ferrets occurred throughout the Temperate Grassland Biome from Texas to Saskatchewan. Their range corresponded closely with the historical range of three species of prairie dogs (*Cynomys* spp.)[1], except in Canada, where their range extended beyond that of prairie dogs (Fig. 1). When associated with prairie dogs, Black-footed Ferrets prey on them and use their burrows for shelter and nesting.[10] To our knowledge, Black-footed Ferrets never have been studied outside the range of prairie dogs.

Between 1900 and 1937 Black-footed Ferrets were collected throughout much of southern Saskatchewan (Fig. 1).[2] They also may have occurred in Alberta and Manitoba, but this is not well documented. The museum record (A1, Fig. 1) is a Black-footed Ferret collected in 1901 near Gleichen, Alberta. There are no reports of ferrets being collected in Manitoba. The last previously reported Canadian specimen was collected in 1937 near Climax, Saskatchewan.

Historic Specimens and Records

Two new specimens have been reported to us. A mounted Black-footed Ferret located in Belmore's Altamont Museum in Coutts, Alberta (J.R. Butler and B. Schultz, *pers. comm.*) was purchased in approximately 1960 but there is no record of its collection location or date. Mr. Schultz said ferrets were common in the area near Coutts about 1950. Another specimen in the Shaunavon Museum, Saskatchewan, was killed in 1965 in a haystack of George Hayes, 2 km from Val Marie (L. Perrault, *pers. comm.*). Although there are no data attached to the specimen it was mounted on a distinctive door panel by a church sister in the presence of Mrs. Perrault's brother (L. Perrault, *pers. comm.*). Mrs. Perrault also reported that Joe Laturnus trapped 18 Black-footed Ferrets near Val Marie in the winter of 1937-1938 and shipped them to Winnipeg where there was no market, so they were returned. That same winter Albert Archer trapped one ferret at Orkney, 30 km southwest of Val Marie.

Searches

There have been two systematic searches for Black-footed Ferrets in Canada.[7,8] The first, conducted from 1975 to 1976, involved more than 200 h searching for ferrets and field signs in prairie dog colonies in southern Saskatchewan.[8] Field signs suggesting the presence of ferrets include: burrow plugging, characteristic diggings, tracks, scats and ferret remains. One prairie dog colony was spotlighted after 30-40 plugged burrows were discovered.[8] Prairie dogs are thought to plug burrows to defend themselves from predators that enter burrows (e.g., ferrets and weasels, *Mustela* spp.)[5], and plugged burrows

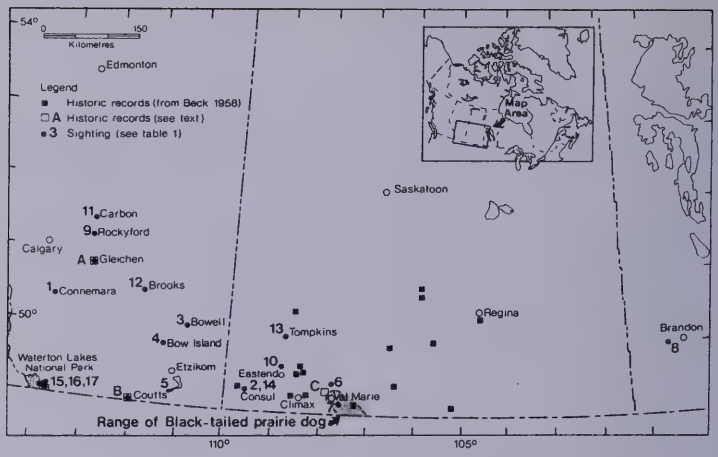

Figure 1. *Distribution of Black-footed Ferret and Black-tailed Prairie Dog in Canada.*

were the only possible field signs of ferrets observed.[8] The second search was made in 1985 by R. Laing in prairie dog colonies and adjacent lands in southern Saskatchewan. The search was concentrated in evening hours with a spotlight. Four of 14 colonies were surveyed, but only two colonies were searched for more than three evenings. Conclusive evidence of Black-footed Ferrets in Saskatchewan was not found, but neither search was conducted in the winter, the most effective time to locate ferret signs.[7 8] Furthermore, searches were concentrated in only a small portion of the historical range of Black-footed Ferrets in Canada.

Collections and Sightings

We contacted 10 public institutions to obtain recently recorded sightings of Black-footed Ferrets. Since 1967, 16 putative sightings (nine in Alberta, six in Saskatchewan and one in Manitoba) were reported to a variety of agencies (Table 1). We communicated with all but two of the original observers and visited all but two of the sites.

In 1972, a carcass was found in southern Alberta (sighting 5).[9] Although the specimen was not collected, the description suggested that it was a Black-footed Ferret. Within the group of sightings we report, the time length varies from a few seconds (sightings 1, 3, 6, 10 & 14) to several minutes. On three occasions the observation period was from 5-30 minutes (sightings 2, 4 & 12). All observations were of individual animals except sighting number 2, in which K. Broderick observed four or five young Black-footed Ferrets near Consul, Saskatchewan, for approximately 30 minutes. He returned 2-3 months later with another person and again observed the ferret group. This is our only sight record of a litter.

Two observations were by individuals familiar with other species of ferrets. Sighting 12 was reported by an Austrian researcher who is familiar with Siberian Ferret (*Mustela eversmanni*), a species nearly identical to the Black-footed Ferret. This observation was for 5-10 minutes at a distance of 10 to 15 m, using 10x40 binoculars. L. Murray (sighting 13) believes the animal he saw was a Black-footed Ferret, based on recognized body features similar to those of a domestic ferret he once owned.

We found the characteristic trenched diggings of ferrets at the locations of sightings 8, 11 and 12. We noted a high density of Richardson's Ground Squirrels near the areas where sightings 8, 10, 11 & 12 were recorded, and Columbian Ground Squirrels at sites 15, 16 & 17. We propose that the density of ground squirrels at these sites could sustain a population of Black-footed Ferrets.

Discussion

All of the sight records in Table 1 suggest that the observers saw a ferret-like animal. Black-footed Ferrets have been confused with Long-tailed Weasels, European ferrets and domestic ferrets. If a face mask or black feet and legs are observed (as in sightings 2, 3, 4, 5, 8, 11, 12, 13, 15, 16 & 17), then a Long-tailed Weasel is excluded. If a black-tipped tail is observed (as in sightings 5, 10, 12 & 15), both European and domestic ferrets are excluded. The strongest indication of the presence of Black-footed Ferrets in southwestern Canada is the relatively recent find by Pinel (1973).

Sightings 2, 4, 15 & 17 are compelling because the observers reported seeing dark masks and dark legs, and record 2 suggests breeding of Black-footed Ferrets beyond prairie dog colonies. This supports our view that Black-footed Ferrets in Canada were representatives of a breeding population and not merely dispersing individuals from populations in the United States.

A close association between Black-footed Ferrets and Black-tailed or White-tailed Prairie Dogs has been well documented by researchers in the United States. Only Black-tailed Prairie Dogs occur in Canada, in a small area in southern Saskatchewan. According to the historical range of the Black-footed Ferret based on museum records, it is apparent that Black-footed Ferrets lived in Canada in the absence of prairie dogs. Given our knowledge of the close dependence of Black-footed Ferrets on prairie dogs, it seems probable they also could have adapted to other species of ground squirrels.

Only one of the 17 Black-footed Ferret reports listed in Table 1 was near a prairie dog colony. Eight sightings were in areas where Richardson's Ground Squirrels were common. Most sightings were in mixed-grass prairie, the least disturbed portion of the Canadian prairie. Of the mixed-grass prairie vegetation type, it is estimated that 32 to 41 percent is still relatively undisturbed.[4 11]

Conclusion

We believe Black-footed Ferrets still exist in Canada in areas well beyond the range of Black-tailed Prairie Dogs. Their former range in Saskatchewan was extensive.[2] Although many areas have been cultivated since the 1930s, large areas of native grasslands still remain and could provide suitable habitat for Black-footed Ferrets, particularly where there are high densities of ground squirrels.

Acknowledgements

We thank those people who provided us with Black-footed Ferret sightings and those who forwarded sighting records to us, namely: R. Ashton, K. Bauer, K. Broderick, J.R. Butler, F.G. Cooch, D. Goble, F. Goble, M. Killaby, D. Muir, L. Murray, E. Nadeau, A. Orsen, L. Pennault, R.H. Russell, R. Sainsbury, B.H. Schulz, F. Spitzenburger, J. Stelfox, N. Tripp, S. van Zyll de Jong, D. Westland, P. Wiebe, M. Wilson and the Calgary Field Naturalists. S. Popowich drafted Figure 1, and M.B. Fenton, H.W. Reynolds and J.P. Goossen provided critical comments on earlier drafts.

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[9] PINEL, H.W. 1973. A recent black-footed ferret record for southern Alberta. *Blue Jay* 31:9-10.

[10] SHEETS, R.G. 1970. Ecology of the black-footed ferret and the black-tailed prairie dog. Unpub. manuscript thesis. South Dakota State University, Brookings, South Dakota. 44 pp.

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Table 1. RECENT BLACK-FOOTED FERRET SIGHTINGS

No.	*Date*	*Location*	*Observers*	*Description*
1)	1967	Connemara, Alberta 1.5 km north	M. Skirrow	No Description, the animal was clearly observed as it ran across the highway, observed at 4:30 p.m.
2)	1968	Consul, Saskatchewan 1 km east	K. Broderick	Litter of four or five Black-footed Ferrets, saw a black face mask, observed twice, once by two observers
3)	08/69	Bowell, Alberta	N. Tripp	Golden brown, weasel size, dark mask
4)	10/69	Bow Island, Alberta	P. Wiebe	Oversized weasel, light body colour, dark mask and legs.
5)	09/72	Etzikom, Alberta West end of Pakowki Lake	H. Pinel	Found a dead, decayed Black-footed Ferret, stubby muzzle, long body, black-tipped tail, black feet and mask, not collected
6)	08/75	Val Marie, Saskatchewan 20 km north	E. Nadeau	No description, ran across Highway #4

7)	08/75	Val Marie, Saskatchewan 15 km south-east	B. Goodhope	No description
8)	06/76	Grand Valley, near Brandon, Manitoba	M. Wilson	Fawn colour, long body approximately 40 cm, dark marking on face
9)	1976	Rockyford, Alberta	R. Sainsbury	Saw a ferret-like animal, believed to be a Black-footed or European Ferret
10)	06/79	Eastend, Saskatchewan 6.4 km north in Chimney Coulee	W. Preston	Very pale colour, larger than a Long-tailed Weasel, with a shorter black-tipped tail
11)	07/80	Carbon, Alberta	D. Westland	Larger than nearby Richardson's Ground Squirrels, face mask
12)	08/85	Brooks, Alberta Tillebrook Provincial Park	F. Spitzenburger	Yellow pelage, black-tipped tail, black face mask
13)	1985	Tompkins Saskatchewan 1 km south	L. Murray	Tawny-brown body, black face mask and black feet, observed in daylight
14)	10/86	Consul, Saskatchewan Nashlyn PFRA Community Pasture	R. Ashton	Saw a Black-footed Ferret chasing a ground squirrel, no description
15)	06/88	Waterton Lakes National Park	F. Goble	Saw a small, thin, beige weasel with black feet, legs and face mask. He reports seeing other ferrets during the summer of 1988
16)	08/88	Waterton Lakes National Park	F. Goble	Saw a weasel-like animal, 30-45 cm long, which had a black face mask
17)	08/88	Palmer Ranch near Waterton Park	A. Orser	Saw a long weasel-like animal with dark face markings, ears and feet

NATURE LIBRARY

THE NATURAL HISTORY OF CANADA

R.D. LAWRENCE. 1988. Key Porter Books, Toronto. 304 pp., illus. colour and b/w, maps, charts, cloth $39.95.

This is a general natural history of Canada written for the layman. In the preface, Lawrence takes care to explain the connection between his philosophy and the style of this book. That connection is important to our understanding of his aim:

> Soon after completing four years of biological studies, during which I majored in mammalogy, I found myself frustrated by the restrictive foci of the science and especially by the fact that my tutors sought to push me towards a cloistered specialty. I wanted to be a generalist; I wanted to study life in the field . . . So I turned to writing...dedicating myself to field study and later interpreting my findings in language understandable to the layman. I feel that it is vital to the well-being of the world to simplify biology for those who need, and want, to be informed, but who cannot grasp the meanings concealed in the jargon-ridden scientific texts and papers.

Of the 17 ecosystems presently recognized in Canada, this book devotes a chapter to each of the 11 vegetation zones, with the shoreline and marine environments being briefly covered in the introduction and in the chapter headed Water and Life. This arrangement, although simplified, works well, and the author gives a picture of each biome and its surrounding zones without overwhelming us with details. A good portrait of the nature of Canada is presented, in keeping with Lawrence's stated intention.

And just imagine — here is a book about Canada that does not first focus on the "East"! This one fittingly begins with the Ice Ages and the Tropical Arctic, since there was the genesis of the Canada we know today. Then it moves south to the tundra and the other biomes: northern transition, boreal, coast, subalpine, alpine, montane, Columbia, grasslands, Great Lakes-St. Lawrence, deciduous and Acadian. There is some discrepancy between the list of biomes given on the map and those in the text, but it only serves to accent the difficulty of classifying rather amorphous natural zones.

The 160 photographs serve to highlight the plants, animals and relationships making up a biome which are spoken of in the text. Most of the pictures are very good; one has been incorrectly captioned: Snow Geese winging across the sky have become Canadas by the time you read the caption. I would rather have seen photo credits with each photo, instead of at the end of the book. The line drawings and silhouettes are not well done; the pastel plates are a bit better, but note that they are not to scale.

However, small faults such as these do not spoil an informative and well-written book. Adults and children alike will be able to enjoy and be motivated by it. Lawrence, in a thoughtful afterword, urges conservationists of every stripe, facing the spectre of environmental destruction on every hand, to speak with one voice if they expect to be heard and heeded. He exhorts us to remember that

> We humans are natural organisms; if we reject our biological heritage (and the fundamental laws of nature that govern our bodies and a large part of our minds), we do so at our peril and without regard for future generations of our own kind or for the health of our world and its nature.

— Reviewed by *Carol Bjorklund*, 3634 McCallum Avenue, Regina, Saskatchewan. S4S 0S5

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